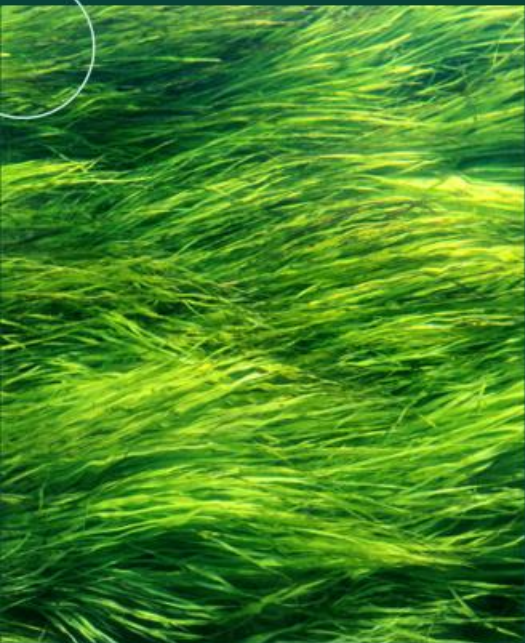


PEPHA[®] CB

*The power of algae for
healthy-looking skin*

range



June 2025

Biotech | Nature, enhanced by science

dsm-firmenich

Algae are becoming a major skincare ingredient...



A story of natural resilience

ALGAE

More than 70% of the earth is covered by water. It provides many unique environments and rich resources.

Oldest plant surviving geological ordeals

Very stable, resistant and resilient organisms

For thousands of years, microalgae has been able to survive under the stress of different environments

Rich in nutrients, like Vitamins & Minerals

Source of effective Bioactives

for pharmaceuticals, nutraceuticals and skincare

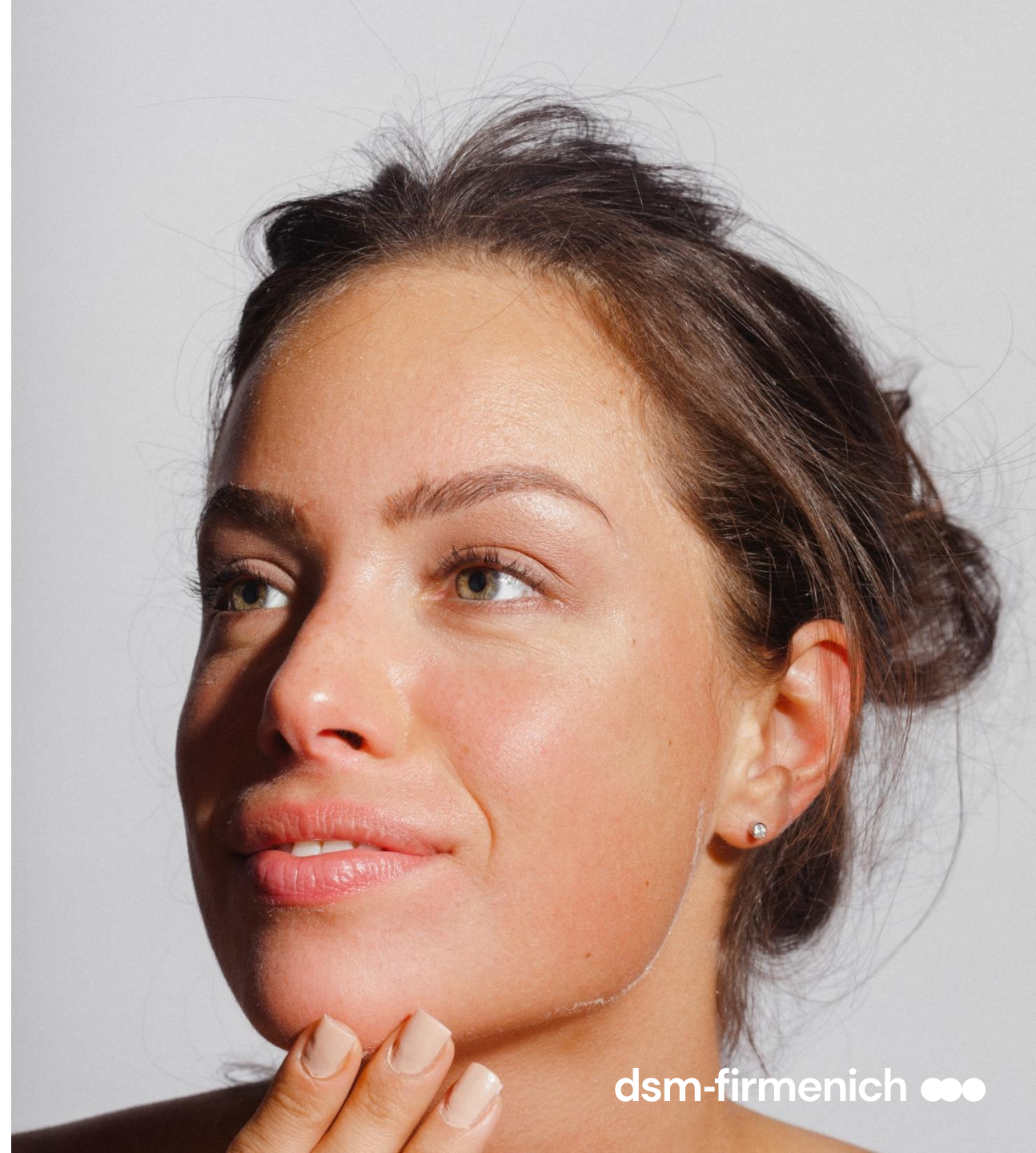
A major ally for the skin!

The skincare benefits of algae are well-known

Algae are superfood for healthy looking skin!

An abundant source of amino acids, vitamins, minerals, antioxidants and essential fatty acids.

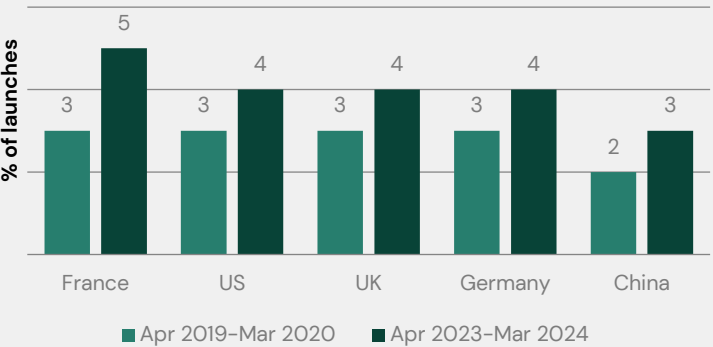
They are known and proven to provide a wide range of highly sought-after skincare benefits, including skin firming, restoration and boosting of Collagen synthesis, skin radiance and protection from blue light which causes skin hyperpigmentation and redness.



Algae keeps buzzing in latest skincare innovation

A dynamic and attractive solution for brands & consumers

Penetration of launches with marine ingredients in Beauty & Care, 2019–24

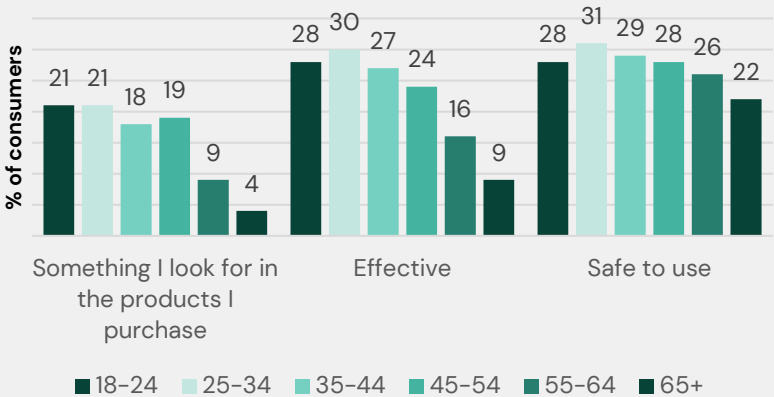


Uncover the potential of emerging marine beauty

Despite ongoing consumer interest, the use of marine ingredients remains relatively small.

However, the segment has grown in key beauty markets such as France, the US and the UK in recent years, indicating promising expectations for expansion.

US consumer perception of marine ingredients by age (2023)

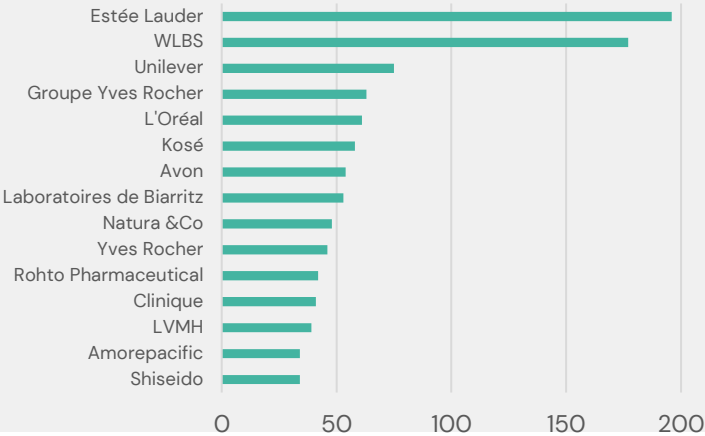


Younger consumers' positive perception

Marine ingredients have been gaining more attention in beauty products.

This is especially so among younger consumers, more of whom perceive these ingredients positively (30% of US consumers aged 25–34 find them effective compared to only 9% of those aged 65+).

Most active companies in skincare with algae (Launches 2020–2024)



Key industry players feature & claim “algae” in latest innovations

Algae remain a popular ingredient claimed by brands across the globe from key industry players. Mainly claimed by botanical & marine brands.

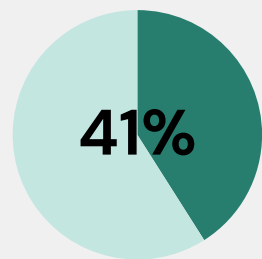
Social media data indicates that global consumers primarily associate marine ingredients with keywords such as health, natural, vitamins and hydration.

Sources: Mintel GNPD (algae/kelp/seaweed; total), April 2019–March 2024
Kantar Profiles/Mintel, November 2023 / US: 1,970 internet users aged 18+ who have used BPC products in the past 12 months
Mintel GNPD Face/Neck Innovations featuring & claiming “algae” in the last 5 yrs / Infegy Atlas/Mintel, April 2021–March 2024

Ticking the box of naturality and sustainability

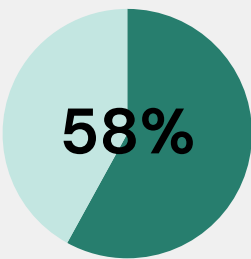
Consumers are seeking natural and ethical ingredients

In the US



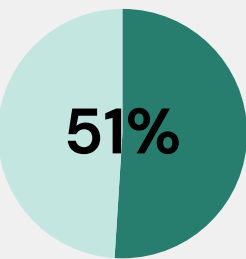
of facial skincare users say it is important for their products to contain natural ingredients

In the UK



of Gen Z beauty users always look for products that are environmentally friendly

In Spain



of adults would be willing to buy BPC made exclusively with lab-grown ingredients if they are better for the planet

Lab-grown is the next-natural in sustainability

Algae can be lab-grown, the key to true sustainability as we reassess our relationship with oceans and planet.

Consumers will be accepting of lab-grown alternatives, perceived as natural and sustainable.

Source: Lightspeed/Mintel

dsm-firmenich PEPHA® CB Range: 3 products & skin benefits

The power of algae for healthy-looking skin



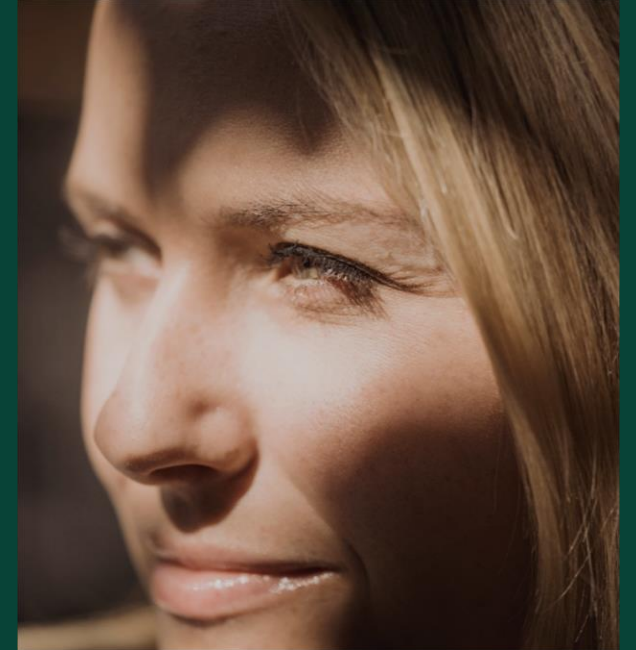
PEPHA®-TIGHT CB

Skin tightening



PEPHA®-CTIVE CB

Skin energizing



PEPHA®-AGE CB

Skin protection

dsm-firmenich PEPHA® CB Range

PEPHA®-TIGHT CB

SKIN BENEFIT

Immediate¹ & long-lasting tightening and firming

ORIGIN

- 100% naturally-derived origin (ISO 16128)
- Derived from ***Nannochloropsis oculata*** microalgae and high performing polysaccharide

BIOTECH

- Sustainably farmed in photo-bioreactors, guaranteeing maximum quality (no risk of contamination, reproducibility of process, fully traceable)
- Polysaccharides obtained from natural fermentation of tapioca starch

DEMONSTRATED EFFICACY

- ***In vitro*** Stimulates fibroblasts' proliferation and Collagen-I; Protects the skin against oxidative stress and urban dust
- ***In vivo Short-term*** Flawless skin after 1 application. Long-lasting lifting result up to 12hrs, already with 2 applications. ***Long-term*** With regular usage wrinkles reduction by over -20%

RECOMMENDED DOSAGE 1–5%

INCI *Nannochloropsis oculata* extract, Pullulan – China listed

PEPHA®-CTIVE CB

SKIN BENEFIT

Energizes skin for revived, glowing complexion

ORIGIN

- 100% naturally-derived origin (ISO 16128)
- Derived from ***Dunaliella salina*** microalgae

BIOTECH

- Sustainably farmed in photo-bioreactors, guaranteeing maximum quality (no risk of contamination, reproducibility of process, fully traceable). Cultivated in controlled conditions, optimally exposed to the right cellular stress: high salinity, high light intensity, nutrient deprivation, and extreme temperatures

DEMONSTRATED EFFICACY

- ***In vitro*** Protects the mitochondria against oxidative stress; Increases the energy content in keratinocytes; Stimulates fibroblasts' proliferation
- ***In vivo*** Induce faster skin renewal and visibly improves skin's luminosity

RECOMMENDED DOSAGE 1–3%

INCI *Dunaliella salina* Extract – China listed

PEPHA®-AGE CB

SKIN BENEFIT

Protects from blue light and UV skin damages

ORIGIN

- 100% naturally-derived origin (ISO 16128)
- Derived from ***Scenedesmus rubescens*** microalgae

BIOTECH

- Sustainably farmed in photo-bioreactors, guaranteeing maximum quality (no risk of contamination, reproducibility of process, fully traceable)

DEMONSTRATED EFFICACY

- ***In vitro & ex vivo*** Prevents skin premature aging; Boosts skin's own defenses against blue light
- ***In vivo*** Reduces blue light induced skin pigmentation (dark spots); evens skin tone

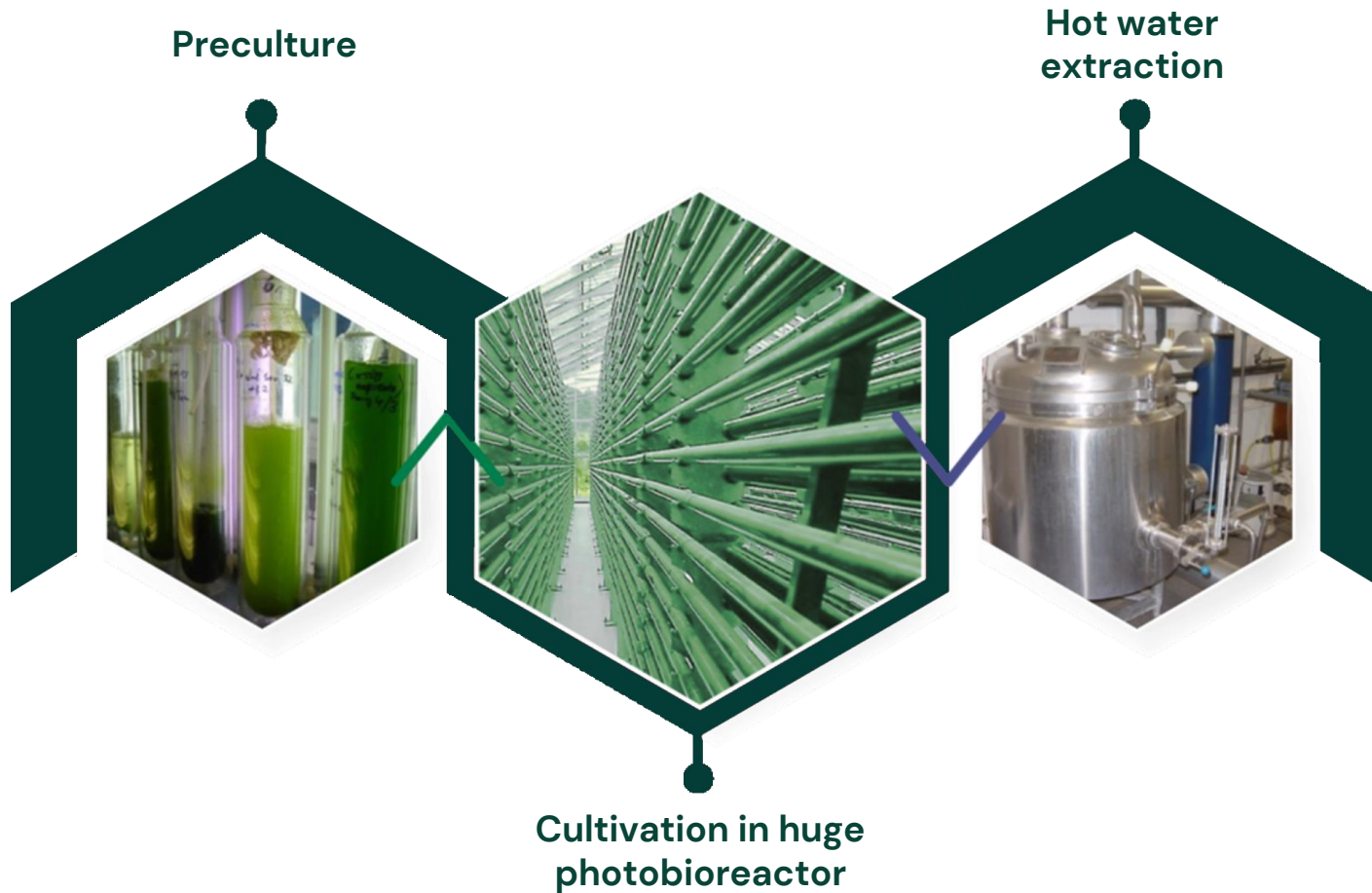
RECOMMENDED DOSAGE 1–3%

INCI *Scenedesmus rubescens* Extract

¹Based on dsm-Firmenich clinical study where improvements in skin smoothness and texture homogeneity were detected already within 15min from 1st product application

The production process

A special growth by photobioreactors, for maximum quality & sustainability



- Maximizes the optimal growth conditions by providing sufficient light and minimizes the contamination risk: **purity, high quality and high content of active substances** are ensured
- Enables standardization
- Respects biodiversity
- High level of renewable sources of energy

PEPHA[®]-TIGHT CB

*The power of algae for
superior skin tightening*



PEPHA®-TIGHT CB

ID Card

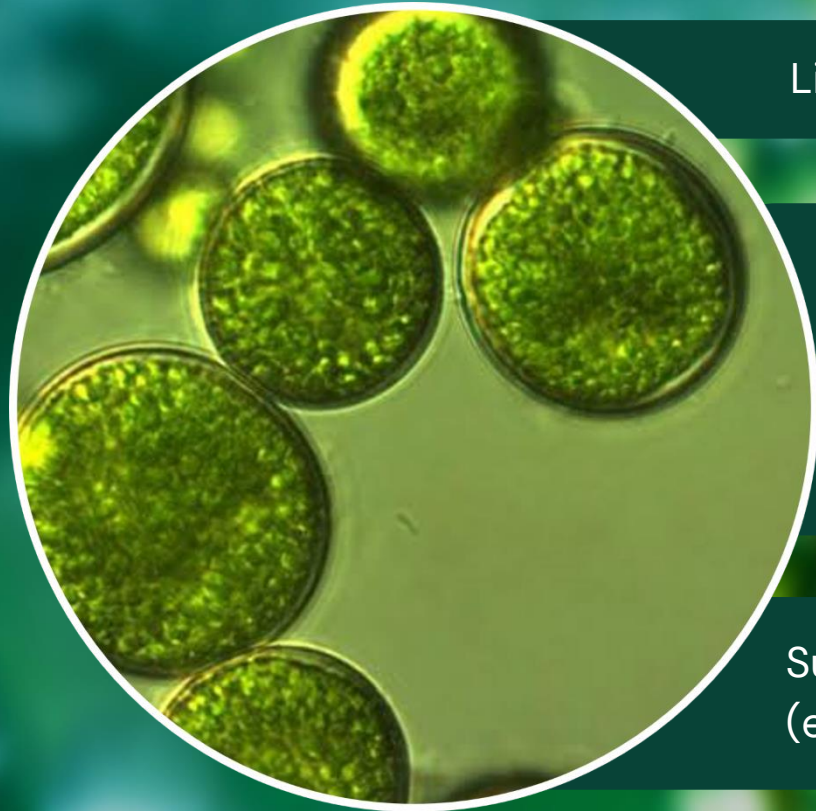
INCI NAME:	Nannochloropsis Oculata Extract, Pullulan, Pentylene Glycol, Citric Acid, Aqua		
TECHNOLOGY:	Sustainably farmed in photo-bioreactors, guaranteeing maximum quality (no risk of contamination, reproducibility of process, fully traceable) Derived from Nannochloropsis oculata microalgae and high performing polysaccharide Polysaccharides obtained from natural fermentation of tapioca starch 100% naturally-derived origin (ISO 16128)		
TECHNICAL:	Form: Transparent to turbid yellow to amber highly viscous liquid Use level: 1–5%	pH of use: 3.5 – 7.5 Preservative: Free	Solubility: Soluble in water
BENEFITS:	- Stimulates fibroblasts’ proliferation and Collagen I* - Protects the skin against oxidative stress and urban dust* - Short-term: Flawless skin after 1 application. Long-lasting lifting result up to 12hrs, already with 2 applications***. - Long-term: With regular usage wrinkles reduction by over -20%		
REGISTRATION CERTIFICATION	  COSMOS APPROVED Raw material verified by ECOCERT GREENLIFE, conform to the COSMOS Standard  		

¹ Based on dsm-firmenich clinical study where improvements in skin smoothness and texture homogeneity were detected already within 15min from 1st product application

* in vitro ** ex vivo *** in vivo

The algae

Nannochloropsis Oculata



Lives in both MARINE and FRESHWATER LAKES

Used for several decades to PRODUCE NUTRACEUTICALS and FEED SUPPLEMENTS

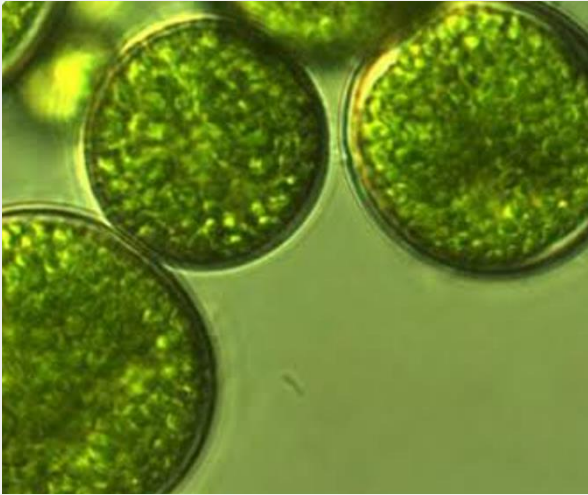
A STRONG COCCOID CELL WALL that protects its bioactives

Supplies the skin with ESSENTIAL AMINO ACIDS, PRECIOUS VITAMINS (especially vitamins C and B12) and POWERFUL ANTIOXIDANTS

Unique combination for efficacy & sustainability

A concentrated mixture of powerful functional ingredients produced by biotechnologies, fully naturally derived & renewable

A transparent concentrated mixture with 3 powerful functional ingredients



Microalgae

Produced in photobioreactor as a more sustainable solution compared to open ponds cultivation

- Safer and better quality
- More respectful of terrestrial biodiversity
- Use of renewable energy



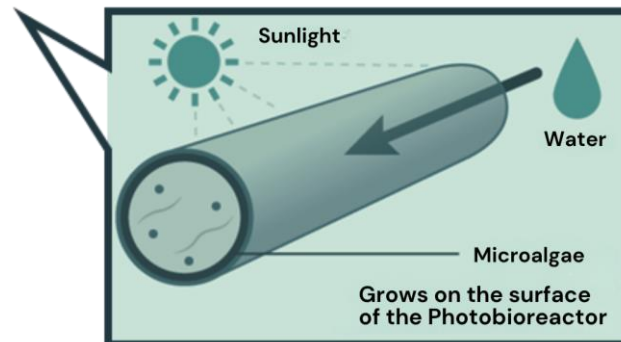
Pullulan

Fermentation of tapioca starch



Pentylene Glycol

Produced from valorised and naturally-derived material

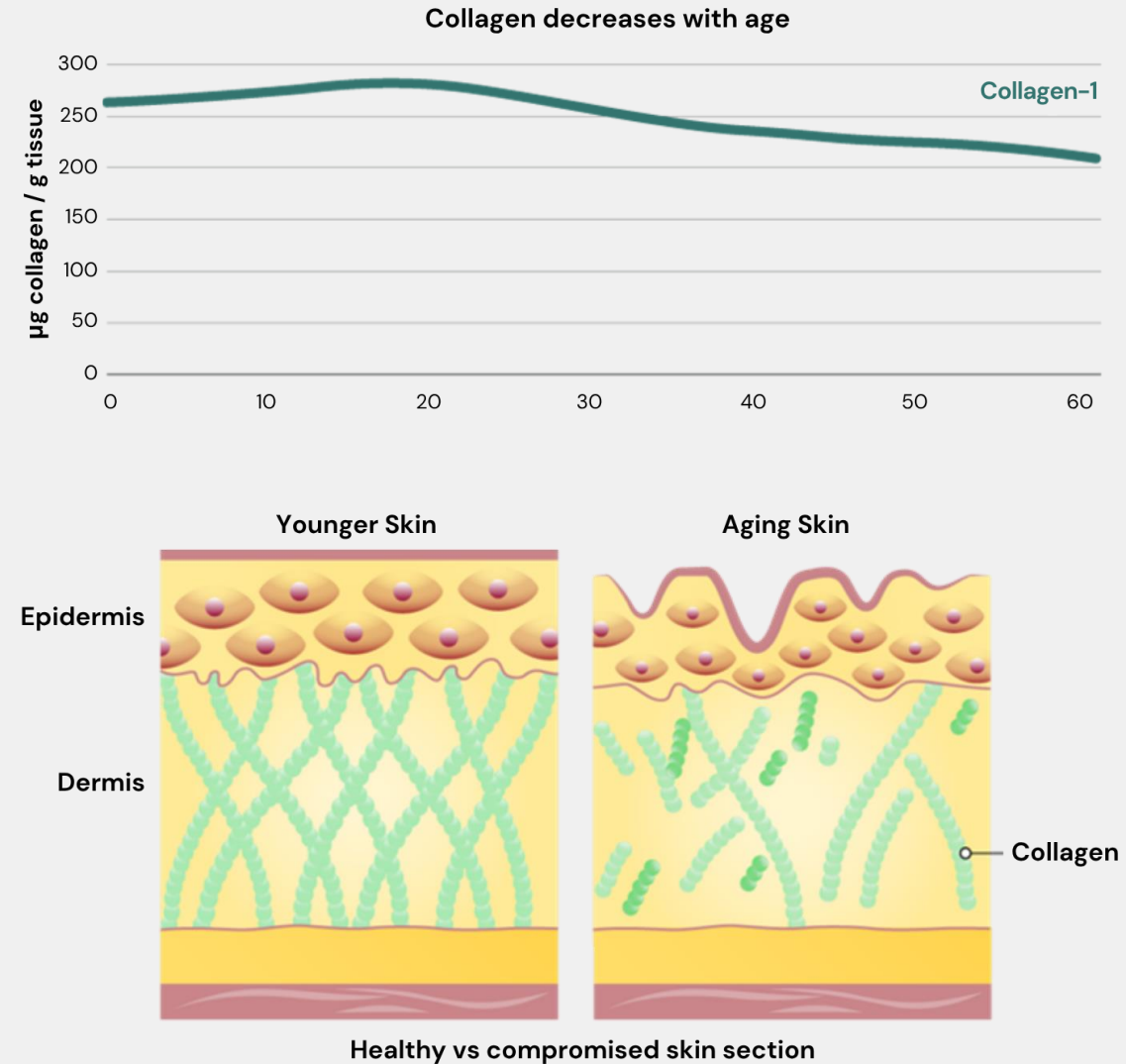


Over time skin works less efficiently

Reference: Asserin et al. (2015) J Cosmet Dermatol, 14, 291–301

Profound changes occur in the structure of the dermis and epidermis, through processes of intrinsic and extrinsic aging, leading to the appearance of wrinkles and the loss of tone

- With age, the Collagen density in the Dermis decreases and its network becomes increasingly fragmented, presenting shorter and less organized fibres.
- An increase in Matrix Metalloproteinase (MMP) expression accelerates the Collagen degradation. In parallel, the synthesis of new extracellular matrix components by dermal fibroblasts slows down, failing to adequately replace the degraded matrix.



How does it work?

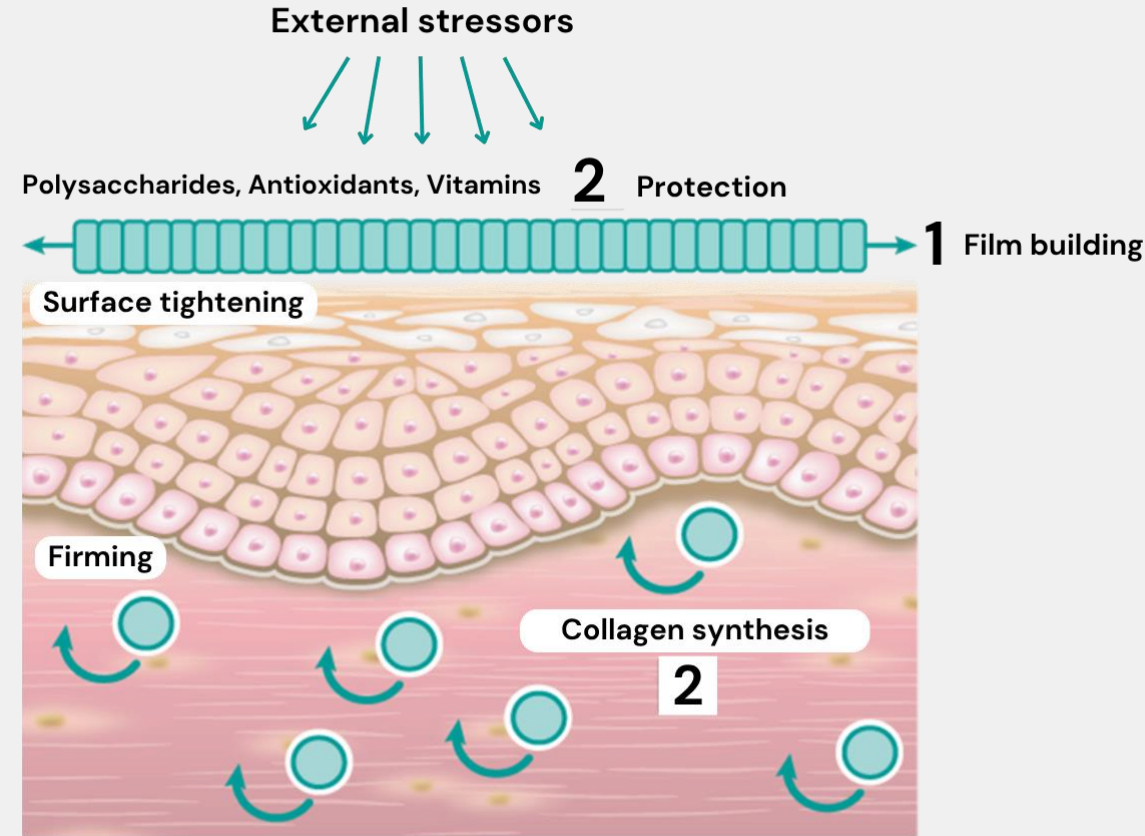
PEPHA®-TIGHT CB combines short- and long-term efficacy

1. Short-term, with 1 application:

PEPHA®-TIGHT CB forms a thin film on the skin, exerting an **instant and long-lasting perceptible skin smoothing & lifting effect**.

2. Long-term, with regular applications:

PEPHA®-TIGHT CB acts as a **protective shield** against oxidative stress, helps to **stimulate the formation of Collagen I**, an essential part of the skin's connective tissue, **helping reducing wrinkles & improving skin elasticity**.



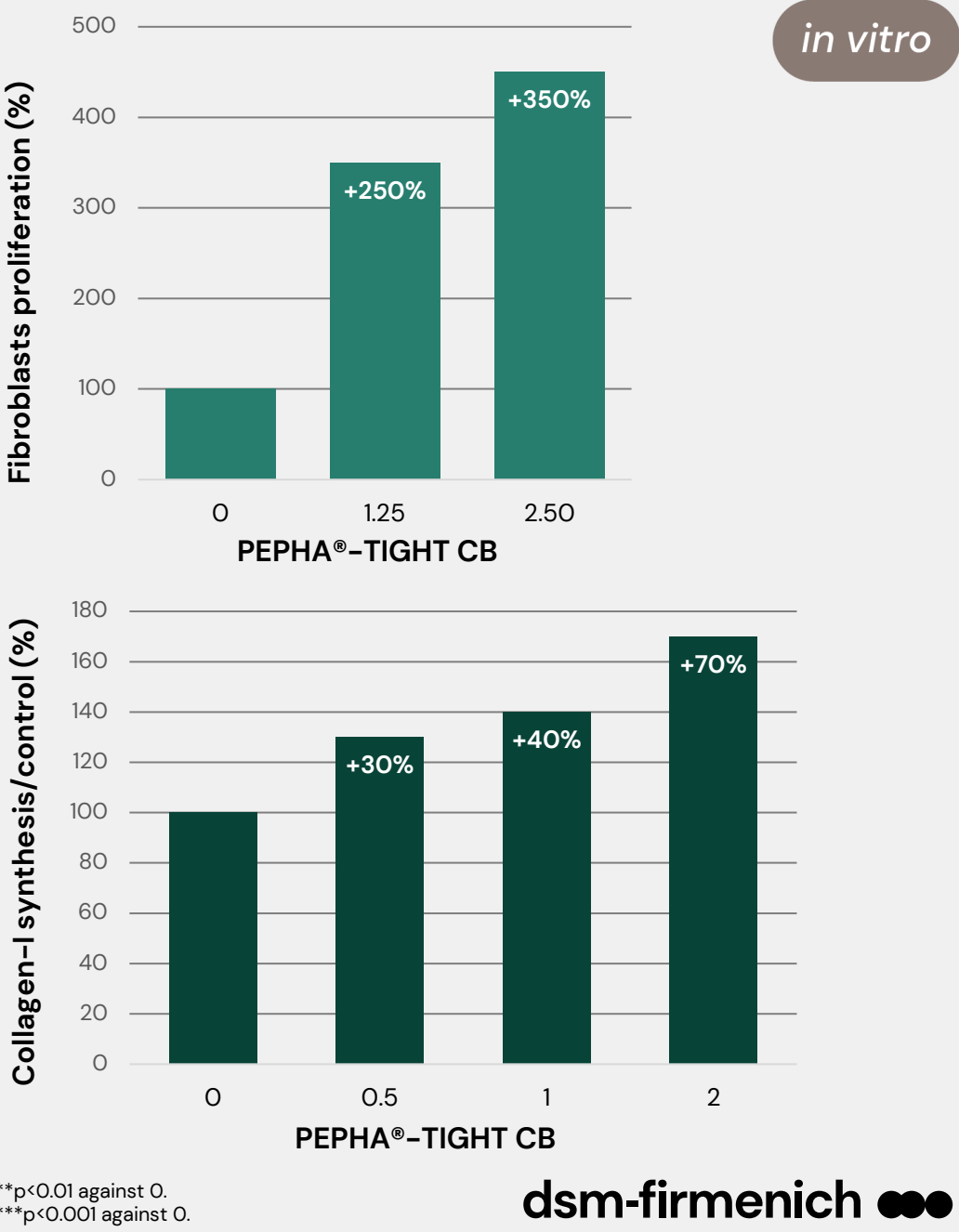
Highly increases fibroblasts proliferation and Collagen-I synthesis

Stimulation of fibroblasts proliferation by 350% and Collagen-I by 70%

Aged skin is characterized by a decline of cell number and proliferative cells. Therefore, less ECM is produced, leading to a lack of structural components, such as collagen fibers. The skin gets thinner, less resilient and less firm.

Results:

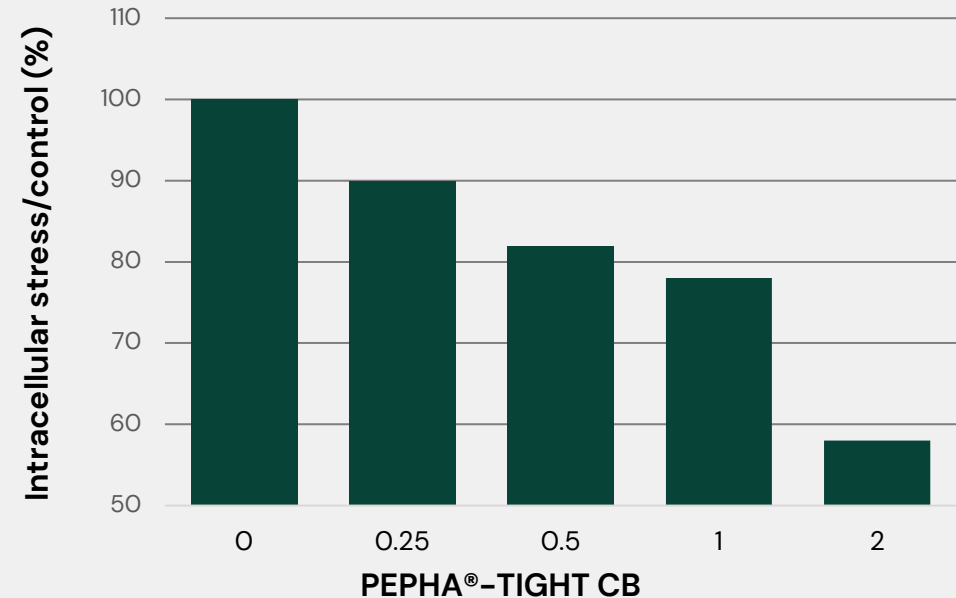
- Increase in cell proliferation of human fibroblasts, and consequently support for collagen production increase.
- Stimulation of Collagen-I synthesis in human fibroblasts, improving the structure of the connective tissue



Protects the skin against stressors

in vitro

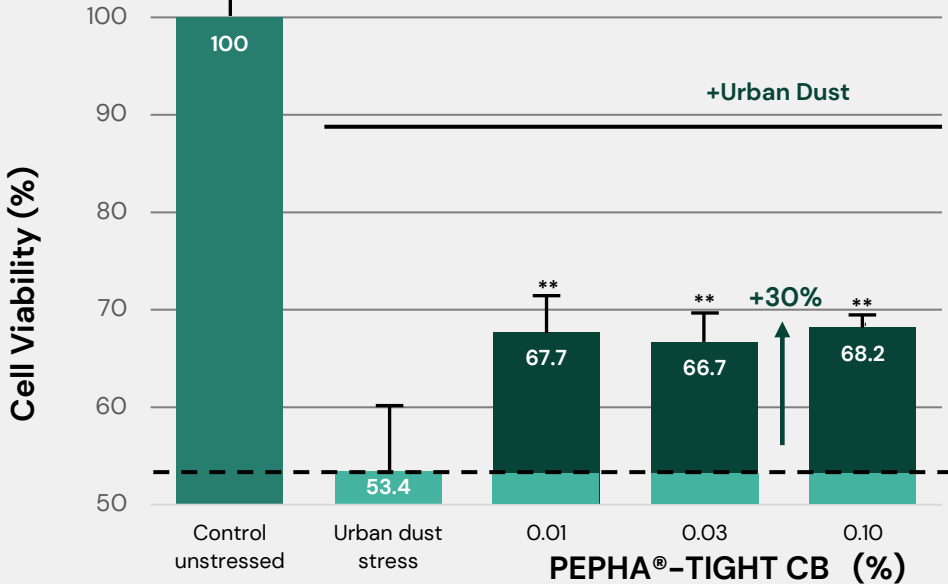
Protection against oxidative stress



Reactive Oxygen Species (ROS) are known to accelerate the aging process. In addition, aged cells are less able to protect themselves against oxidative stress. This leads to an accelerated collagen breakdown and cross-linking of proteins. The skin gets thinner and less resilient. In vitro protection was measured by the ROS assay: Human fibroblasts were exposed to hydrogen peroxide (H₂O₂) to induce an intracellular oxidative stress. The release of ROS was quantified by fluorescence staining.

Results:
Dose dependent protection of human fibroblasts from oxidative stress, and consequently, protection of the collagen fiber network from damaging processes.

Protection of cell viability against urban dust



Used in the dsm-firmenich assay and research Standard Reference Material® (SRM) 1649b “urban dust” is an authentic surrogate for urban air pollution of the National Institute of Standards and Technology (Gaithersburg, MD, USA).

Results:
With PEPHA®-TIGHT CB, cell viability improves up to +30% vs stressed cells

Urban dust: SRM16495 extract, Mean ± SD, It=3, Student t-test, ** p 0.01 vs. urban dust stressed cells

Short-term *in vivo* Study

Study design, Spring 2022 (Lyon, France)

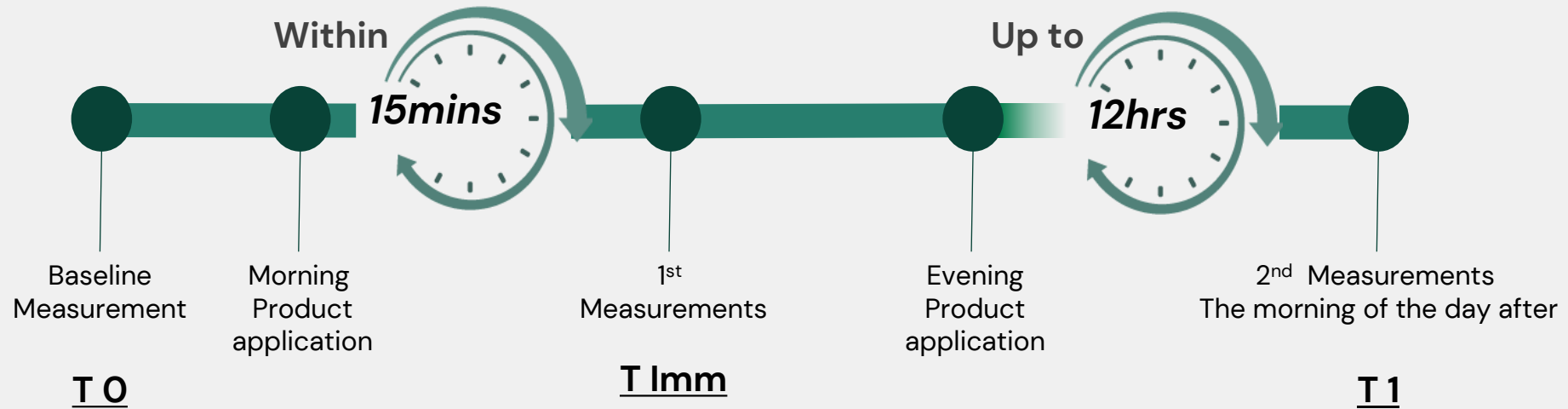
in vivo

Randomized double-blind, mono-center study. Caucasian female volunteers.

Two groups:

- Placebo & 3% PEPHA®-TIGHT CB
- 27 volunteers by group, 40-65 years (mean 55 years)

Twice daily product application



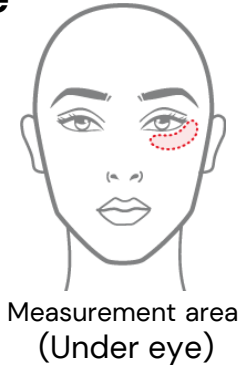
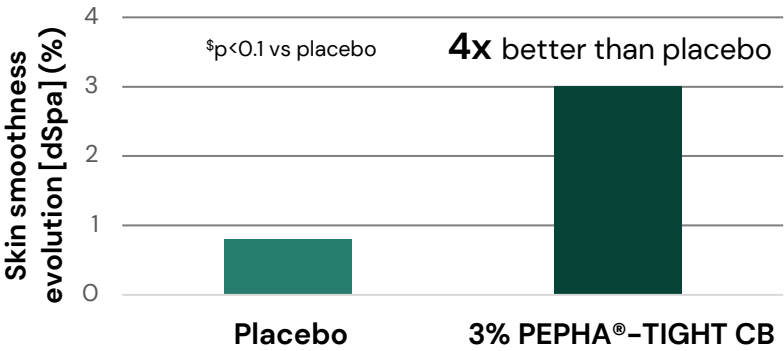
Flawless skin in minutes with PEPHA®-TIGHT CB

SkinCam measurement

in vivo

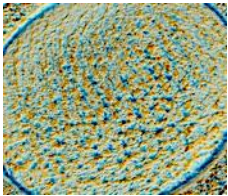


Skin Smoothness Improvement below eye

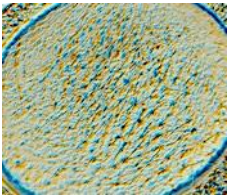


Immediately after 1 application

Volunteer 19

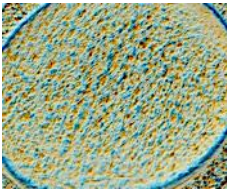
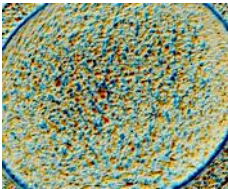


Baseline

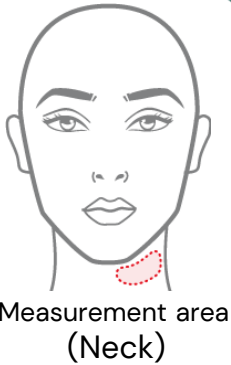
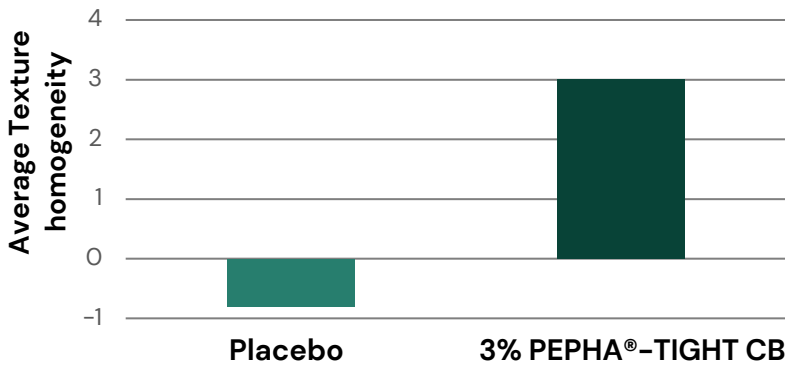


Immediately after 1 application

Volunteer 36

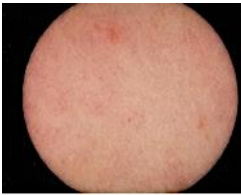


Skin Texture Improvement on Neck Area

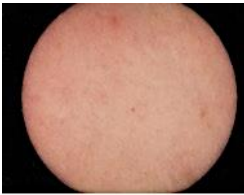


Immediately after 1 application

Volunteer 09

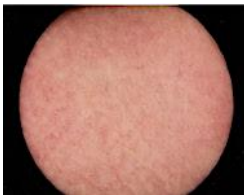


Baseline



Immediately after 1 application

Volunteer 58



SkinCam takes an image of the skin surface and shows how the irregularities of the skin texture evolve.

After PEPHA®-TIGHT CB application, skin surface appears smoother and texture more homogeneous

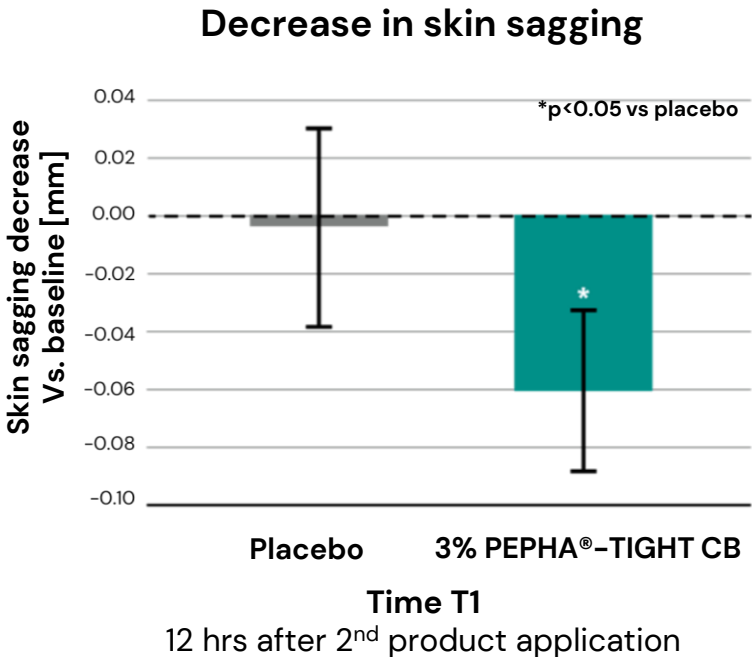
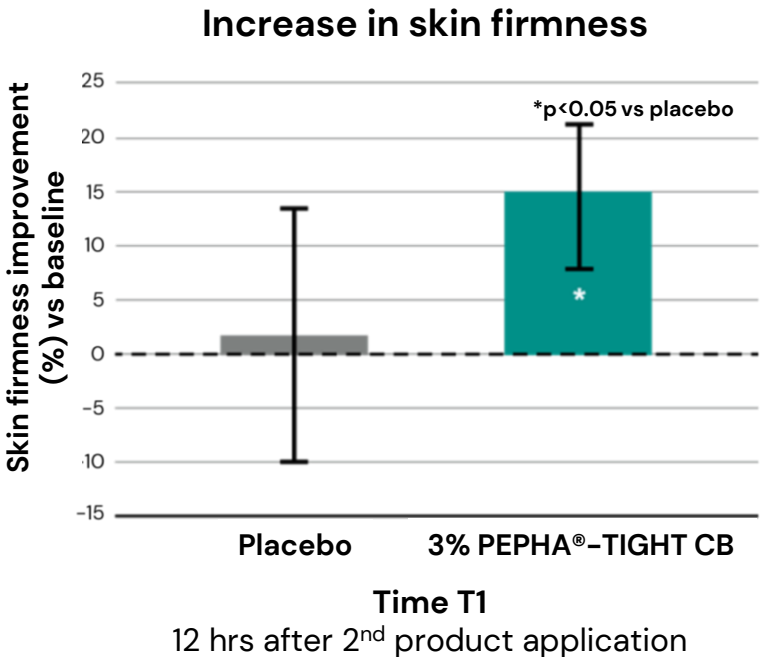
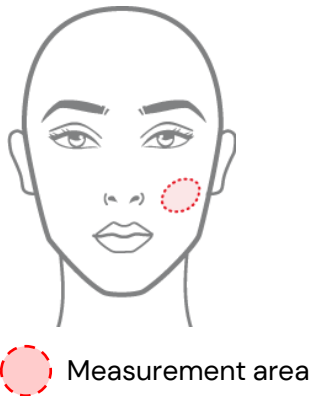
Significant long-lasting lifting effect with PEPHA®-TIGHT CB

SkinFlex measurement

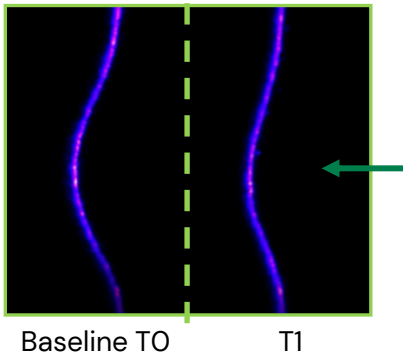
in vivo



PEPHA-TIGHT CB is 13X better than placebo



Volunteer 39
Skin deformation upon strain



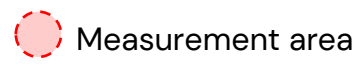
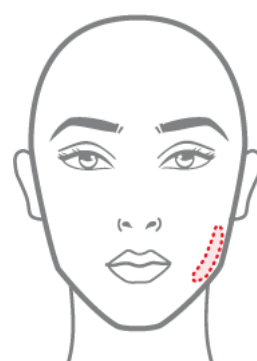
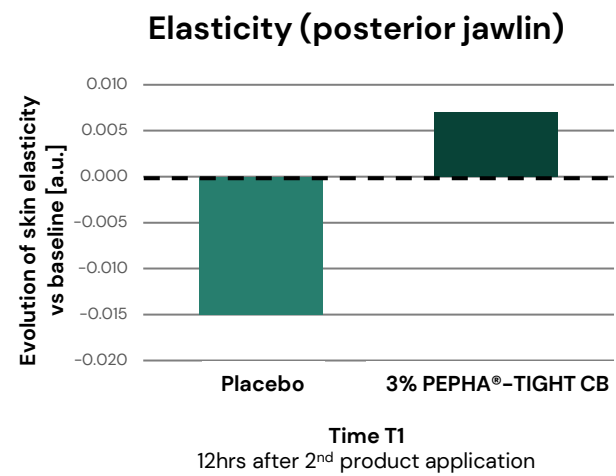
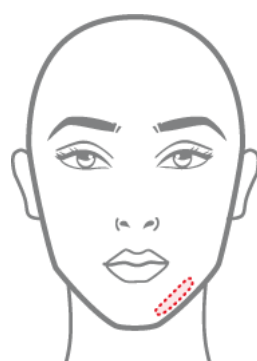
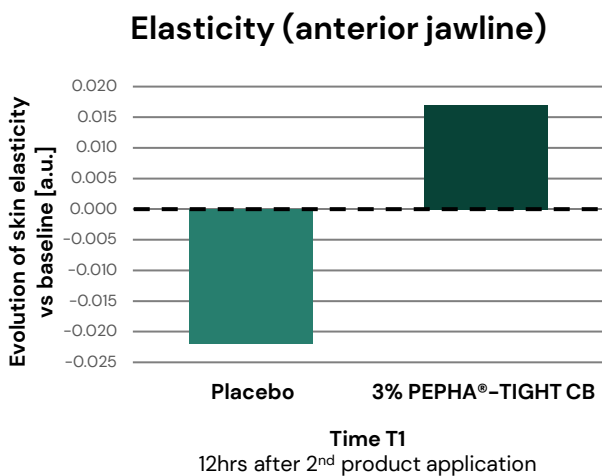
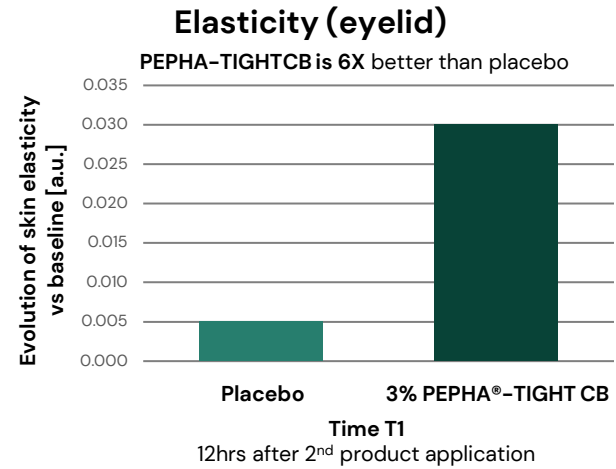
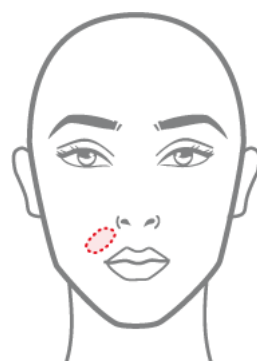
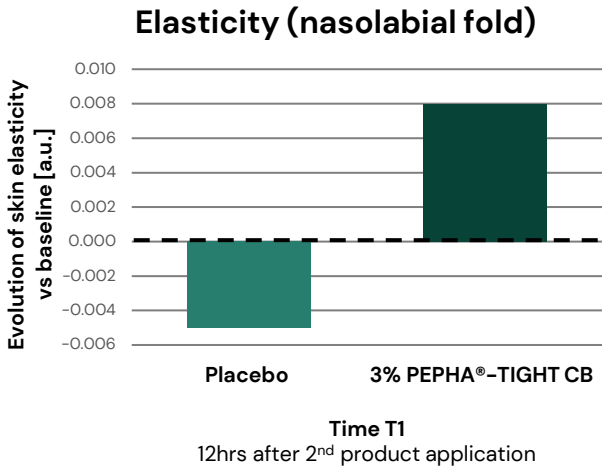
An airstream is blown perpendicularly to the cheek: it pushes the skin inwards forming a kind of “hole” in the cheek. The firmer & more lifted is the skin, the more it’s able to resist the airstream, as shown for Volunteer 39 in the pic

Skin gains elasticity in critical facial areas with PEPHA®-TIGHT CB

Cutometer measurement

The Cutometer applies a vacuum to the skin, pulls on the skin and then lets it go. The time, velocity and return to the original position are measured, from this the elasticity is calculated. Elastic skin can bounce back to its original position fully and fast. with PEPHA®-TIGHT CB, we see an improvement of this skin behavior.

in vivo



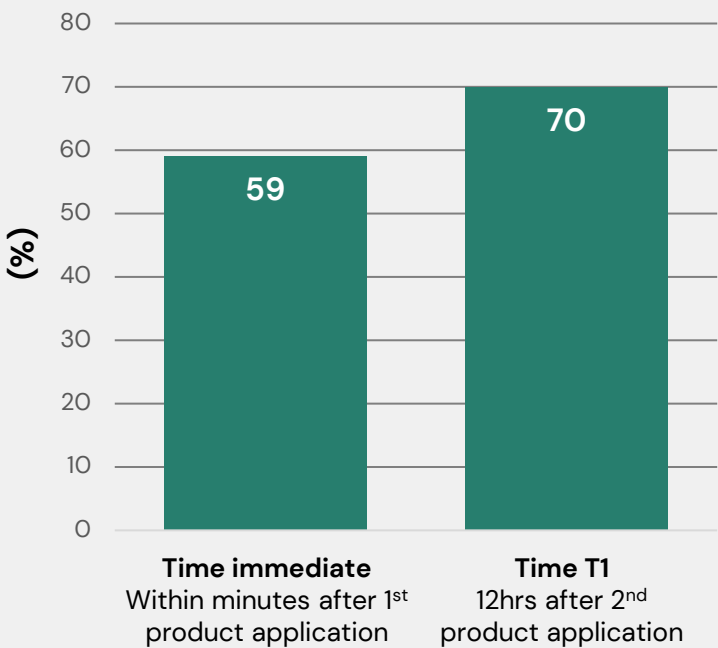
Consumers perceive the improvement

Qualitative questionnaire, for immediate & long-lasting perception

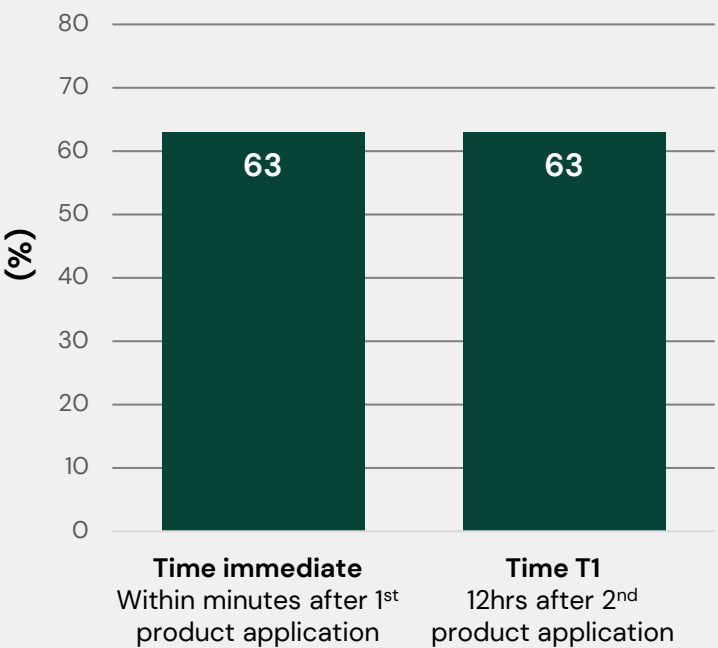
in vivo

% of affirmative answers to «My skin looks & feels firmer with PEPHA®-TIGHT CB»

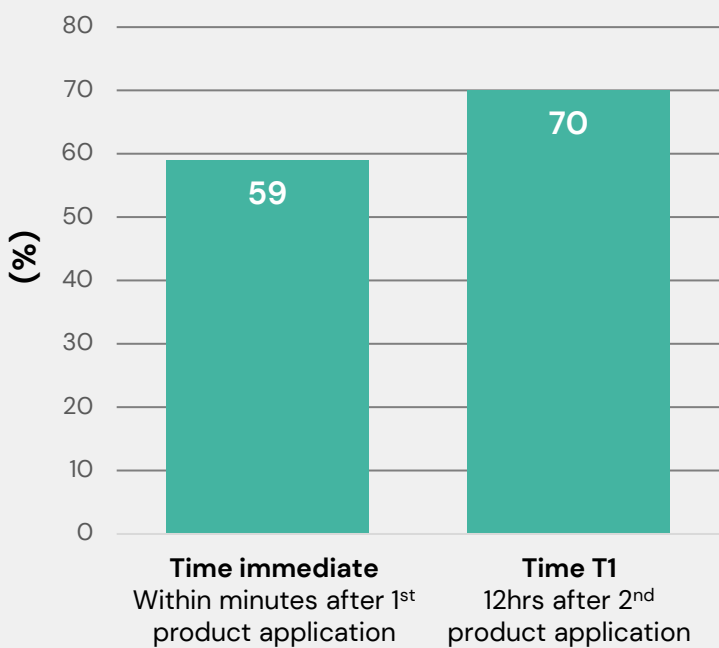
Overall facial skin



Skin around the eyes



Neck & neckline

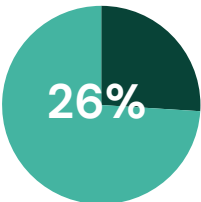


Long-term well-aging result with regular usage of PEPHA®-TIGHT CB

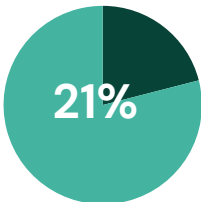
in vivo

Profilometer and Cutometer measurement

Wrinkle reduction (profilometry):

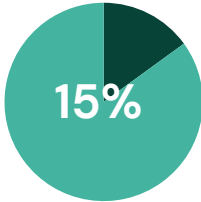


reduction of wrinkle surface

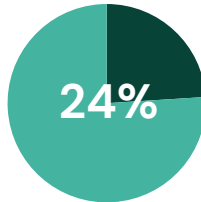


reduction of wrinkle length

Skin firming (cutometry):



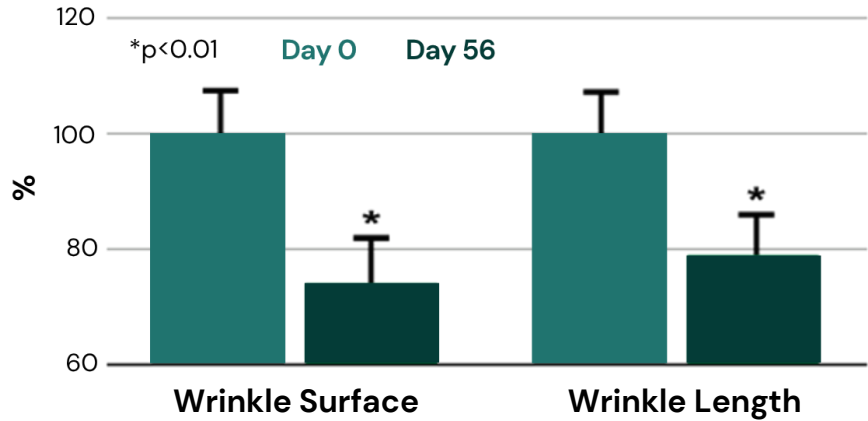
improvement of elasticity



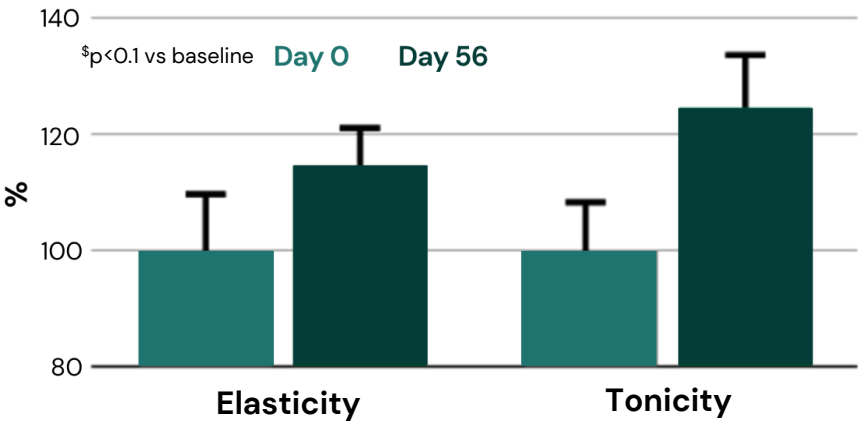
improvement of tonicity

Cream with 3% PEPHA®-TIGHT CB applied on the face twice daily over 2 months. 13 female volunteers 30-55y.o., mean 40yrs.

Visible wrinkle reduction after 2 months



Long-term skin firming results after 2 months!



Formulation Guidelines

PEPHA®-TIGHT CB

INCI name (active):

Nannochloropsis oculata Extract, Pullulan

- Viscous, yellowish to amber solution
- Stable at pH ranges from 3.5 to 7.5
- Should be processed below 50°C
- Suggested concentration: 1–5%

Cosmetic application

- Facial skin tightening products
- Protective care for long-term firmer skin
- Firming and lifting Neck & Décolleté formulations
- Added value for anti-wrinkle products



PEPHA®-TIGHT CB

Supported marketing claims

- Flawless skin within minutes¹
- With just 1 application, skin surface appears smoother and texture more homogeneous
- Long-lasting lifting effect, up to 12hrs from last application
- Skin gains elasticity in critical facial areas
- After multiple applications, long-term well-aging effect with wrinkles reduction by over -20%

¹Based on dsm-firmenich clinical study where improvements in skin smoothness and texture homogeneity were detected already within 15min from 1st product application



PEPHA®-TIGHT CB B2C potential

This ingredient serves different market trends & products' narratives

Fast Beauty

Looking for rapid & perceivable skin improvements

- **Consumers want** instant gratification and fast visible results. Consumption can also be occasion driven (e.g. a special meeting, a night out, the wedding day...and consumers want to look at their best).
- **We offer:** PEPHA-TIGHT® provides smoother skin texture & flawless skin within minutes from 1st application. Long-lasting lifting effect, proven to last up to 12hrs

Good Beauty

Looking for transparency and solutions that can make a positive impact

- **Consumers want:** compromised-free solutions, good for the skin & for the planet.
- **We offer:** PEPHA-TIGHT® combines efficacy and sustainability.
 - Rapid and long-lasting visible results, already with 1 application.
 - Derived from microalgae and high performing polysaccharides, produced by biotechnologies, fully naturally-derived & renewable. Vegan-friendly, COSMOS approved

Healthy Beauty

Beautiful skin starts with healthy skin

- **Consumers want:** solutions that goes beyond the superficial, as they know that beautiful skin starts with healthy skin
- **We offer:** PEPHA-TIGHT® microalgae, superfood for more resilient and healthy-looking skin. It delivers smoother & lifter skin already after few applications. Additionally, with a more regular consumption, it can act as a protective shield against oxidative stress and pollution, for long-term well-aging effects. This 2 in 1 proposition, might also serve the "minimal beauty" positioning

dsm-firmenich solution: PEPHA[®]-TIGHT CB

The fast lane to superior skin tightening

in vitro PEPHA[®]-TIGHT CB:

- Stimulates Fibroblasts' proliferation by +350% and Collagen-I by +70%
- Protects the skin against oxidative stress and urban dust

in vivo PEPHA[®]-TIGHT CB:

- **Within minutes from 1st application:**
 - Visibly smoothens skin texture for an immediate¹ flawless effect
- **Up to 12hrs long-lasting effect:**
 - Skin looks and feels firmer, more lifted and more elastic already after 2 applications
- **Long-term result, after 2 months treatment:**
 - Reduces the wrinkles' surface by -26% and length by -21%
 - Improves skin elasticity by 15% and tonicity by 24%

¹Based on dsm-firmenich clinical study where improvements in skin smoothness and texture homogeneity were detected already within 15min from 1st product application



PEPHA[®]-CTIVE CB

*The power of algae for
energized and glowing skin*



PEPHA®-CTIVE CB

ID Card

INCI name:	Dunaliella Salina Extract, Aqua, Citric Acid, Pentylene Glycol		
TECHNOLOGY:	● Sustainably farmed in photo-bioreactors, guaranteeing maximum quality (no risk of contamination, reproducibility of process, fully traceable). Cultivated in controlled conditions, optimally exposed to the right cellular stress: high salinity, high light intensity, nutrient deprivation, and extreme temperatures ● Derived from Dunaliella salina microalgae ● 100% naturally-derived origin (ISO 16128)		
Technical:	Form: Yellowish clear liquid Use level: 1–3%	pH of use: 3.0 – 6.0 Preservative: Free	Solubility: Soluble in water
Benefits:	● Protects the mitochondria against oxidative stress* ● Increases the energy content in keratinocytes* ● Stimulates fibroblasts’ proliferation* ● Induces faster skin renewal by 4 to 5 days, for a Induce faster skin renewal and visibly improves skin’s luminosity***		
Registration certification	 Raw material verified by ECOCERT GREENLIFE, conform to the COSMOS Standard 		

* in vitro ** ex vivo *** in vivo

The algae

Dunaliella salina



Dunaliella salina is a very **small unicellular microalga** in the green algae family

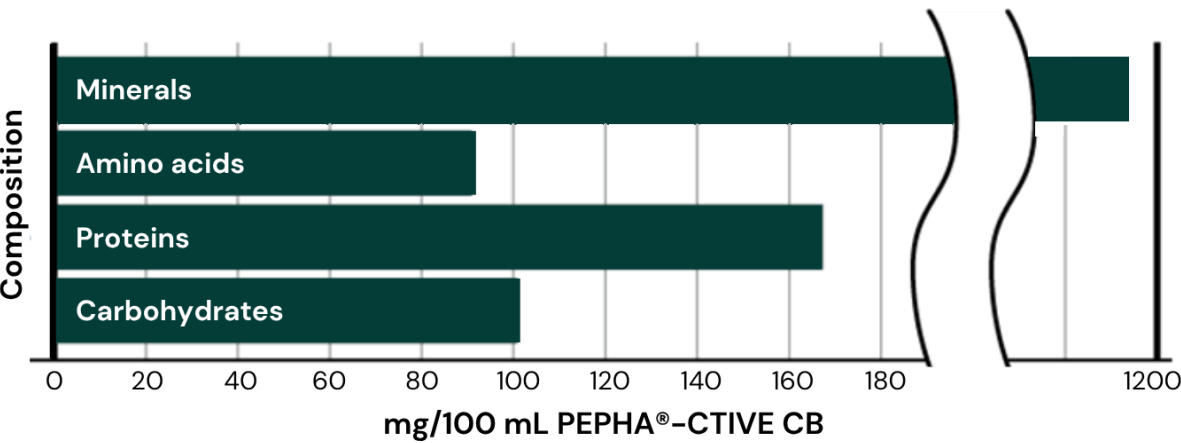
It was first discovered in 1838 by Dunal in the salters of Montpellier, on the Mediterranean coast of France.

Naturally grows in salt lakes with up to 30% salinity (9x higher than regular sea water) and **constantly exposed to harsh environmental conditions** (High osmotic pressure, elevated oxygen levels and high UV irradiation).

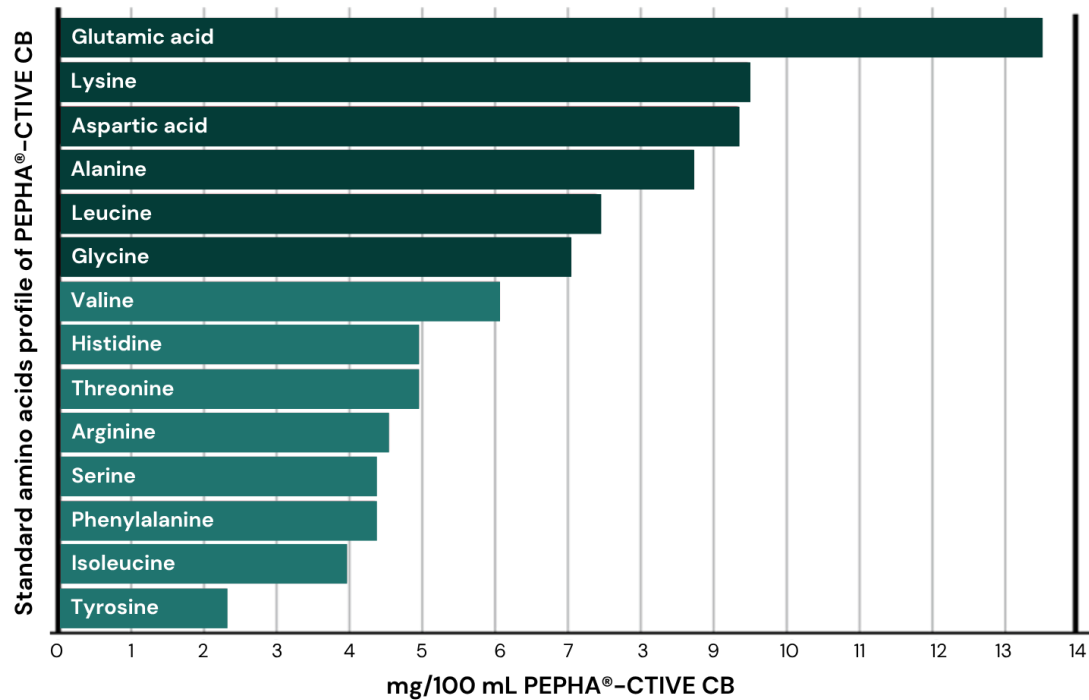
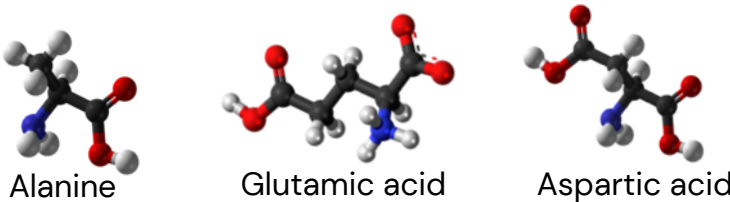
To withstand these conditions, the microalgae **produces high levels of energy** through photosynthesis and adapts by generating large amounts of beta-carotene, which gives it (and so the water) a pinkish color

Unique Amino Acids composition

PEPHA®-CTIVE CB



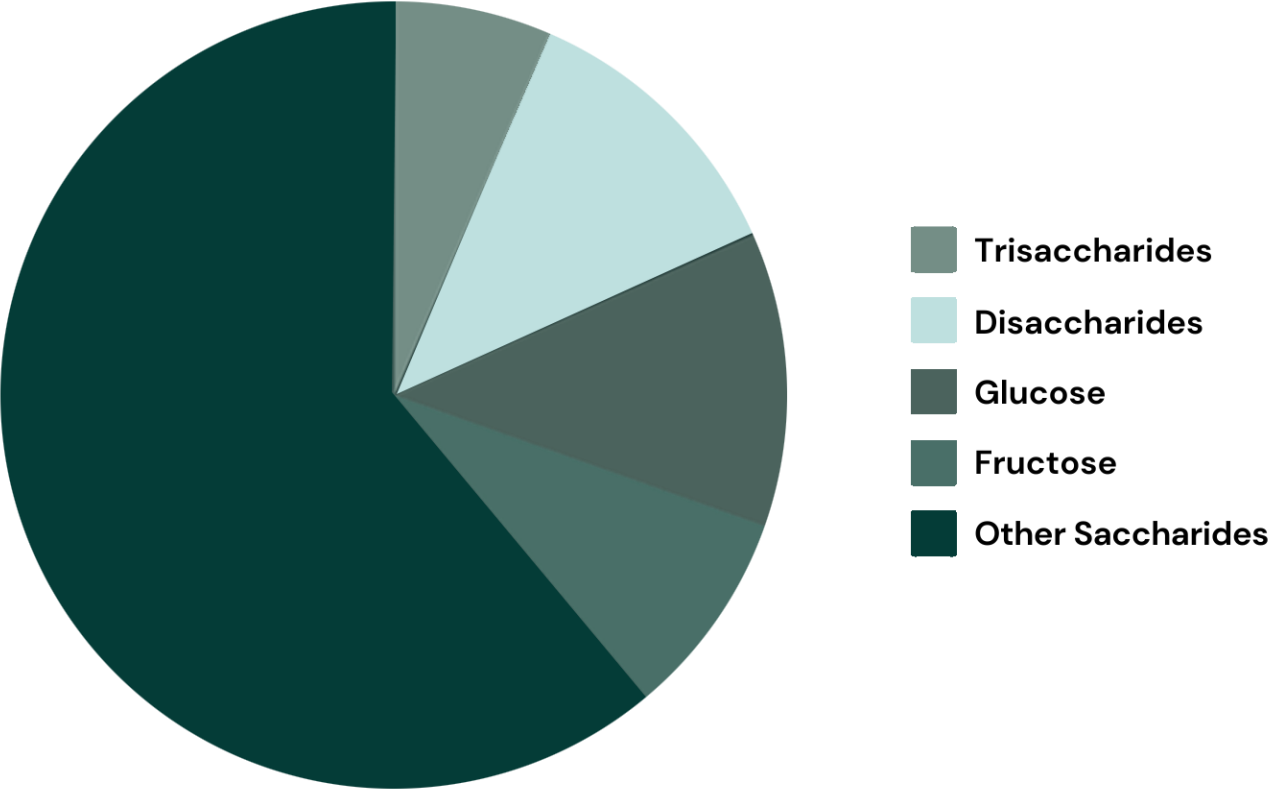
Essential to cell energy production:



Amino acids, proteins, carbohydrates, and minerals are fundamental bio-catalysts and building blocks for the cellular metabolism, e.g. ATP synthesis

PEPHA®-CTIVE CB's Carbohydrates

Source of cellular energy

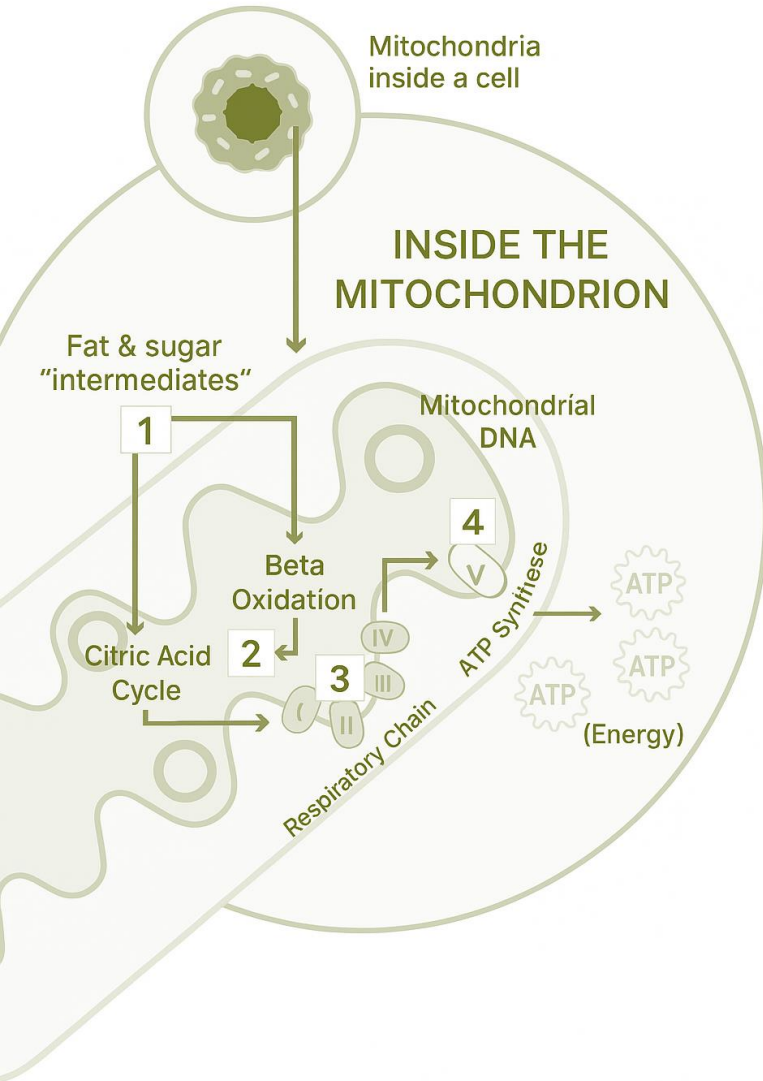


Essential role of carbohydrates for cells metabolism, communication, and structure



Mitochondria

The secret power within cells



Mitochondria are the **power stations of skin cells**, responsible to produce ATP.

ATP is necessary to maintain the functionality of cells.

Over time, the **mitochondria lose their activity**.

The skin cells are not sufficiently supplied with energy anymore, their **functionality is reduced**.

Feeling a power blackout? When skin gets dull & tired

Energized & luminous skin

- ↑ Cell respiration
- ↑ Energy metabolism
- ↑ Cell turnover

**Luminous, Youthful-
looking skin**



Tired & dull Skin

- ↓ Cell respiration
- ↓ Energy metabolism
- ↓ Cell turnover

**Atonic, dull and
stressed-looking skin**



dsm-firmenich solution: PEPHA®-CTIVE CB

The secret of a natural glowing skin

In vitro PEPHA®-CTIVE CB:

- Protects the mitochondria against oxidative stress caused by free radicals
- Increases the ATP content in keratinocytes up to +140%
- Increases the proliferation rate of fibroblasts up to +320%

In vivo PEPHA®-CTIVE CB:

- Induces faster skin renewal by 4 to 5 days, for a fresher looking appearance
- Visibly improves skin's luminosity for more than 4 out of 5 consumers



Cell's battery protection

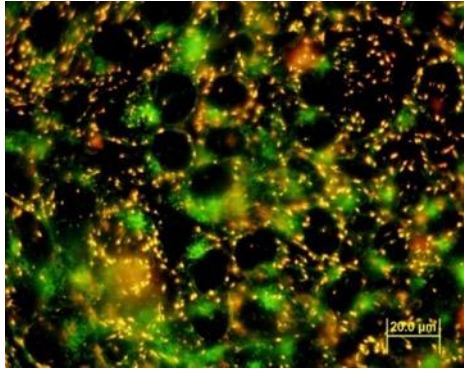
PEPHA[®]-CTIVE CB



in vivo

Protection

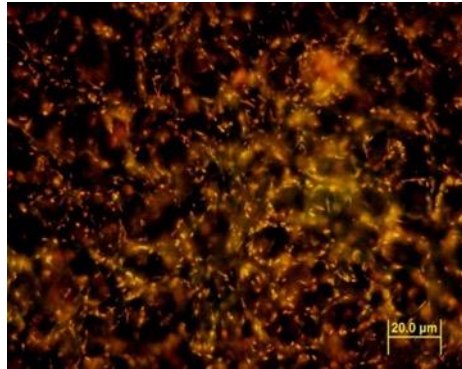
Fluorescence microscopy



Control

Stressed with 500 $\mu\text{mol H}_2\text{O}_2$

↳ **Visible green staining**



1% PEPHA[®]-CTIVE CB

Stressed with 500 $\mu\text{mol H}_2\text{O}_2$

↳ **No visible green staining**

- *in vitro* assay with **human keratinocytes HaCaT**
- Cells treated with PEPHA[®]-CTIVE CB vs. untreated cells
- 24 hours incubation
- **Oxidative stress** with 500 $\mu\text{mol H}_2\text{O}_2$
- Mitochondria polarization indicated by fluorescence
- **Healthy mitochondria appear red**

PEPHA[®]-CTIVE CB visibly protects the mitochondria against oxidative stress caused by free radicals

Cell's battery protection up to 150%

PEPHA®-CTIVE CB

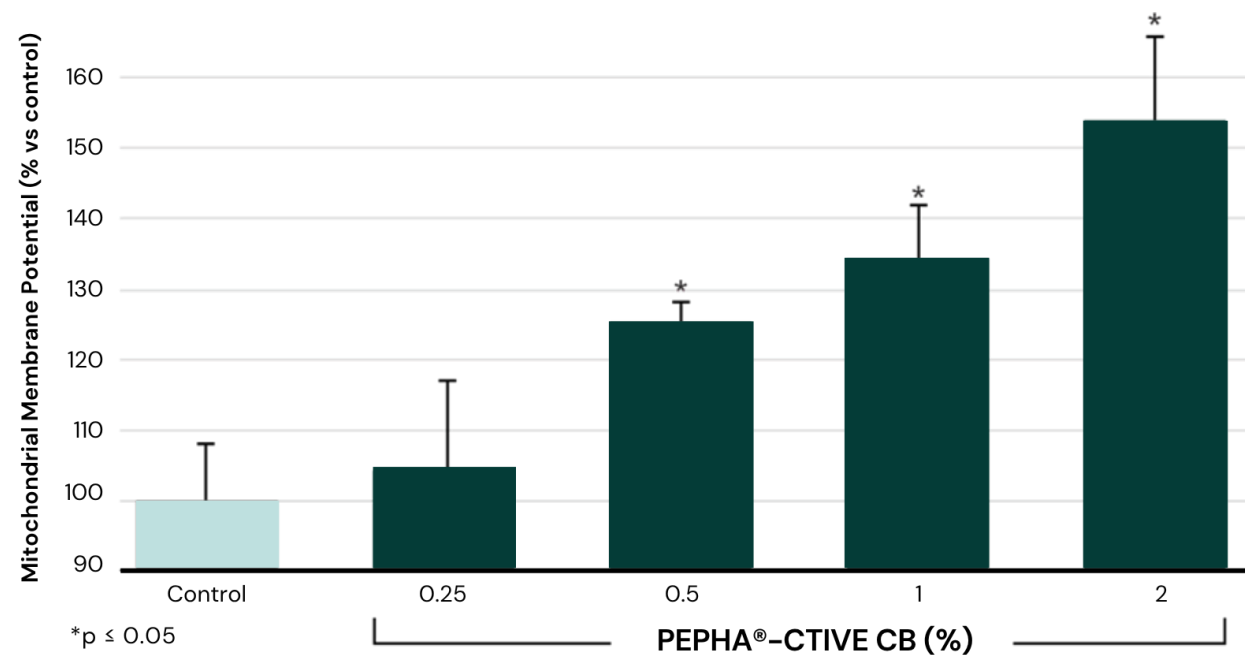


in vivo

Protection

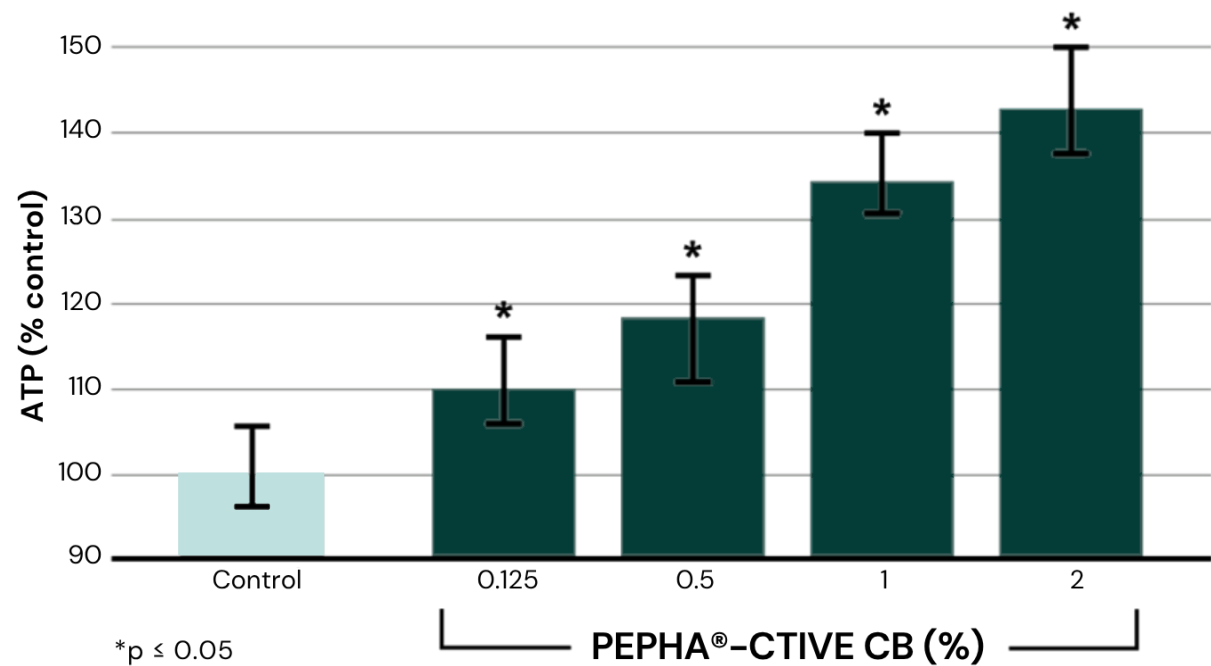
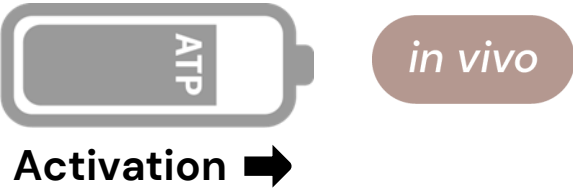
- *in vitro* assay with **human keratinocytes HaCaT**
- Cells treated with PEPHA®-CTIVE CB vs. untreated cells (control)
- 24 hours incubation
- **Oxidative stress** with 2mM H₂O₂
- Mitochondria polarization indicated by fluorescence

Quantitative assay



PEPHA®-CTIVE CB dose-dependently protects the mitochondria against oxidative stress caused by free radicals

Cellular energy activation up to 140% PEPHA®-CTIVE CB



- *in vitro* assay with **human keratinocytes HaCaT**
- Cells treated with PEPHA®-CTIVE CB vs. untreated cells (control)
- 48 hours incubation
- Measurement of cellular ATP content

PEPHA®-CTIVE CB significantly und dose-dependently increases the ATP content up to 140%

Cellular proliferation up to 320%

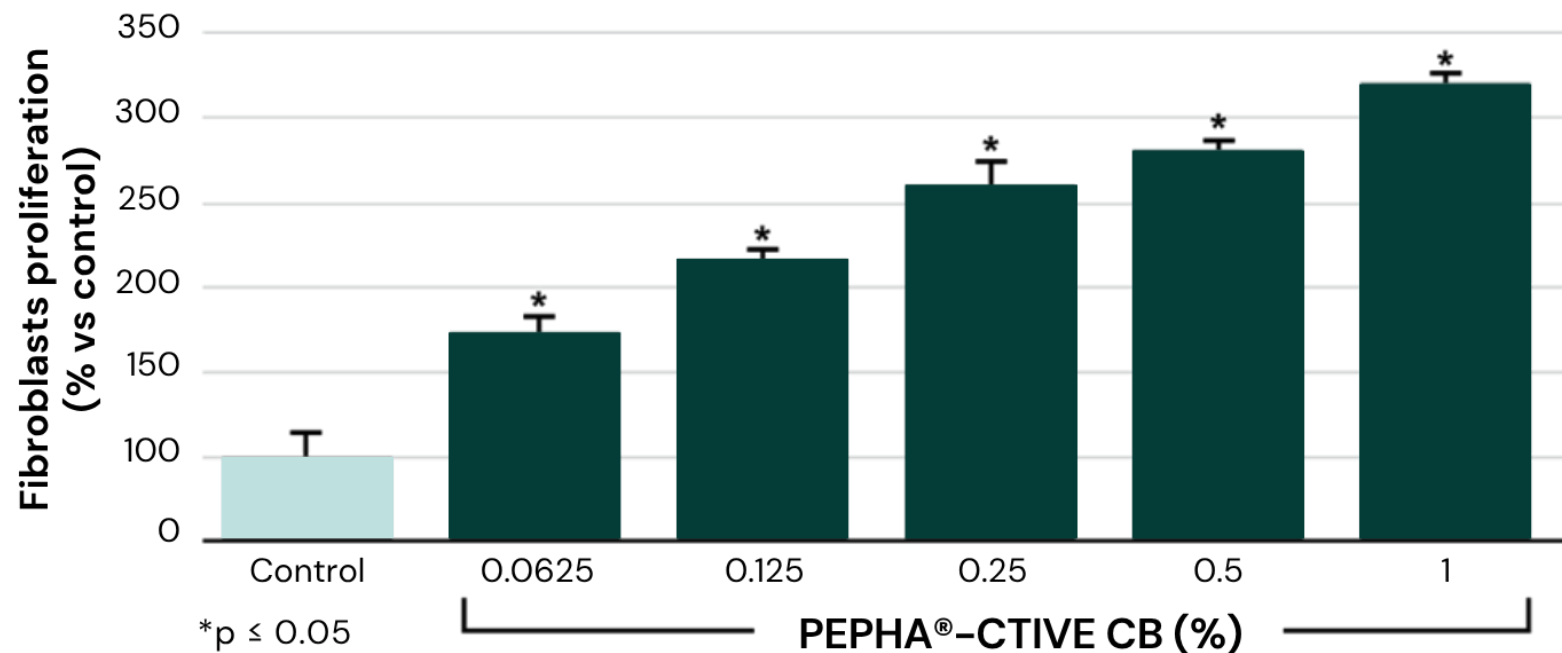
PEPHA[®]-CTIVE CB



in vivo

Activation →

- *in vitro* assay with **normal human fibroblasts from skin**
- Cells treated with PEPHA[®]-CTIVE CB vs. untreated cells (control)
- 24 hours incubation
- Fibroblasts quantification by ELISA



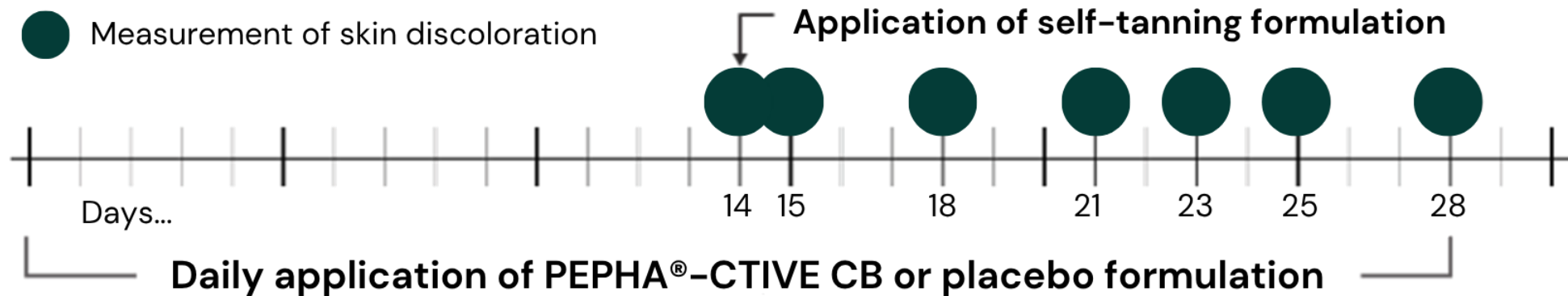
PEPHA[®]-CTIVE CB significantly increases the fibroblast proliferation up to 320%

Skin renewal

Study design

in vivo

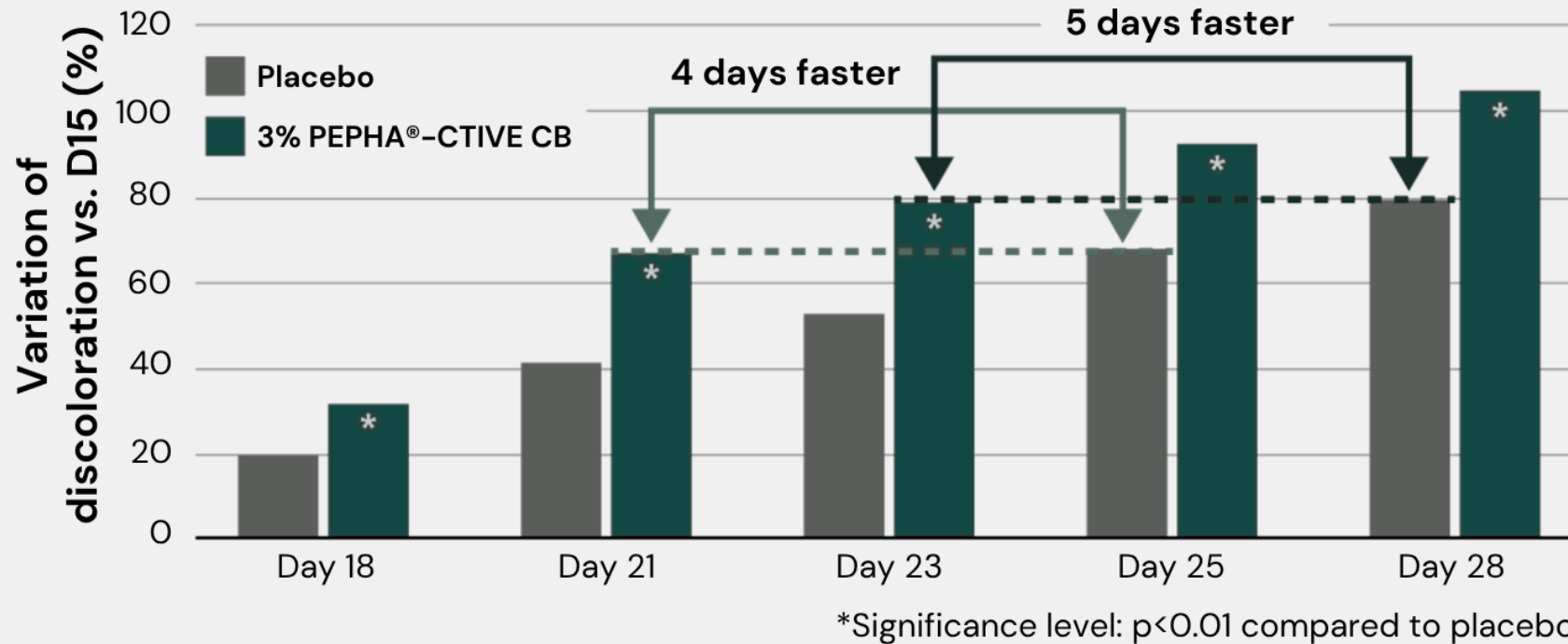
- 20 female volunteers, 22 – 65 years old
- Placebo controlled study; 3% PEPHA[®]-CTIVE CB in a cosmetic formulation
- Application:
 1. **Day 0 – Day 28:** across 4 weeks, randomized daily application of the PEPHA[®]-CTIVE CB formulation on one forearm, and of the placebo on the second forearm;
 2. **Day 14:** after the first 2 weeks, tanning of the skin with a unique application of a DHA formulation (on both forearms);
 3. **Days 15, 18, 21, 23, 25, 28:** measurement of skin discoloration, correlated to the skin renewal
- Parameters: Skin coloration (Chromameter)



5 days faster skin renewal for luminous looking skin

PEPHA®-CTIVE CB

in vivo



- PEPHA®-CTIVE CB visibly increased the skin renewal, inducing a faster skin renewal by 4 to 5 days.
- Result is a luminous looking appearance.

Skin complexion

PEPHA®-CTIVE CB

Volunteers

- 30 female volunteers, 35 – 60 years old
- Presenting a dull skin complexion
- Phototype I to III

Formulation

- 3% PEPHA®-CTIVE CB in a cosmetic formulation

Application

- Randomized half-face application
- Twice daily
- 28 days

Parameters

- Evaluation of the CLBT-Parameters (Colour, Luminosity, Brightness, Transparency) by trained professionals
- Self-evaluation questionnaire

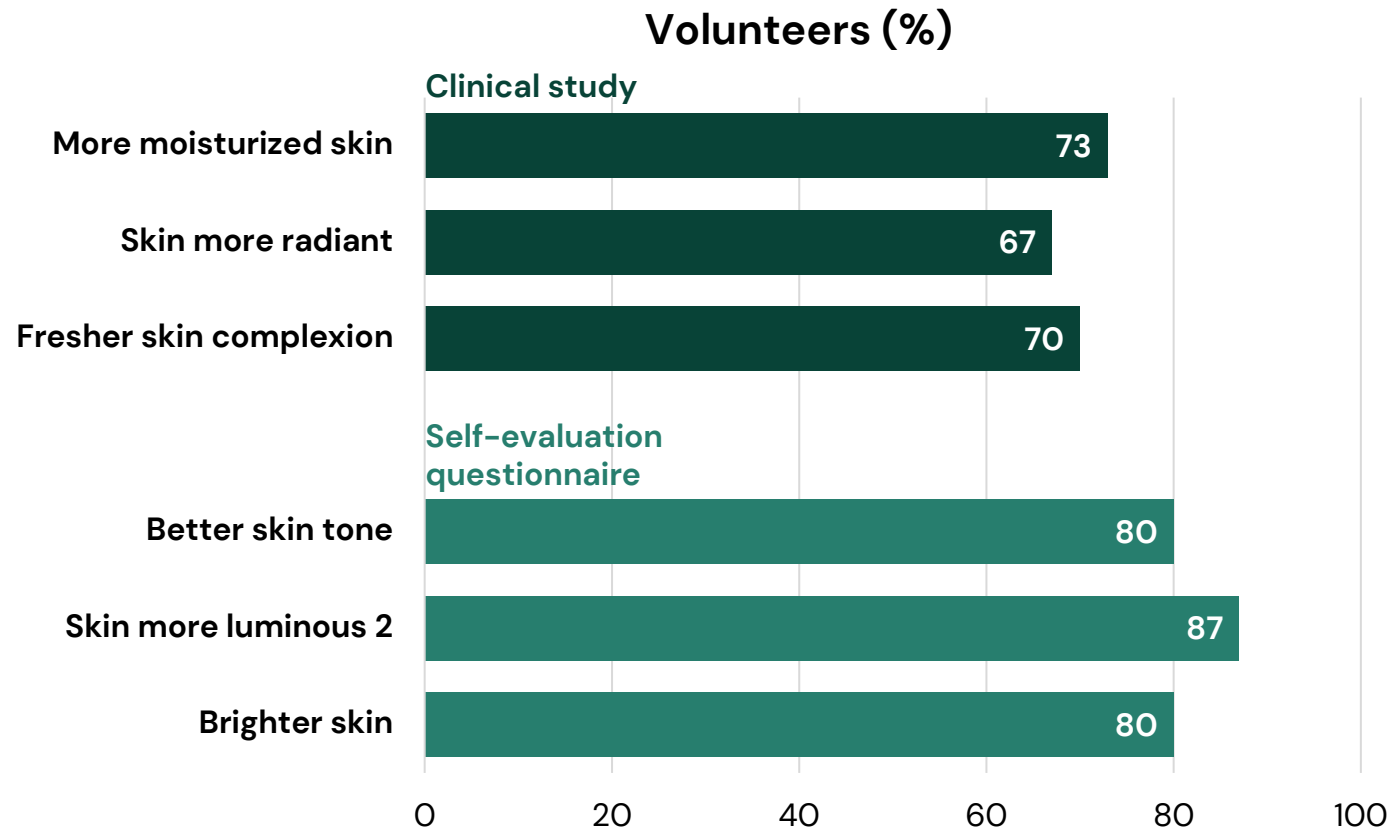
in vivo



Perfect luminous skin with the microalgae power

PEPHA®-CTIVE CB

in vivo



- PEPHA®-CTIVE CB visibly improves skin's luminosity for more than 4 out of 5 consumers.
- Excellent acceptance among users, with a significant improvement in skin complexion.

Formulation Guidelines

PEPHA[®]-CTIVE CB

INCI name (active): Dunaliella Salina Extract

- Clear, yellowish liquid
- Stable at pH ranges from 3.0 to 6.0
- Should be processed below 50°C
- Suggested concentration: 1–3 %

Cosmetic application

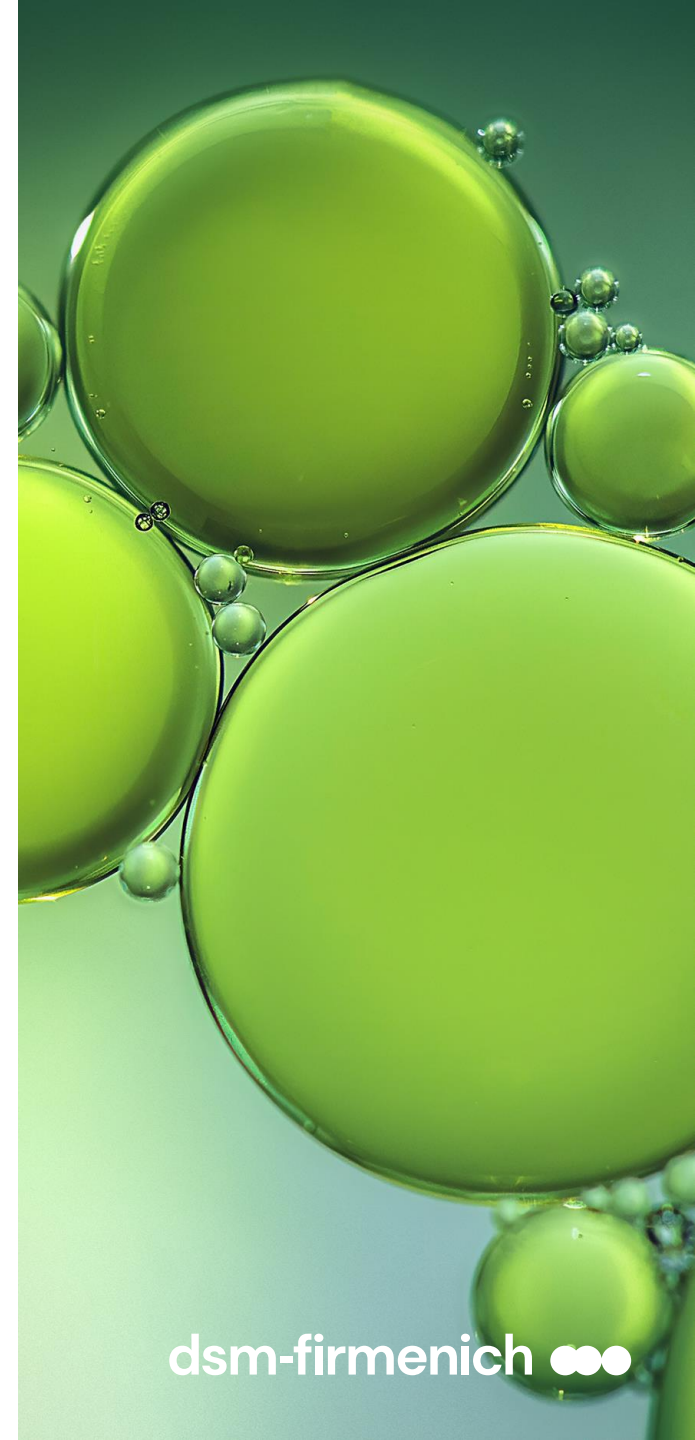
- Skin energizing facial product
- Glow, radiance enhancer
- Protective day care for fresher and radiant looking skin



PEPHA[®]-CTIVE

Supported marketing claims

- Clinically proven to improve skin glow on 9 users out of 10
- It accelerates skin cell turnover for fresher looking skin... faster!
- 80% of users showed a visible improvement in skin brightness in Clinical Study
- Excellent acceptance among users, with a significant perceived improvement in skin complexion



PEPHA[®]-AGE

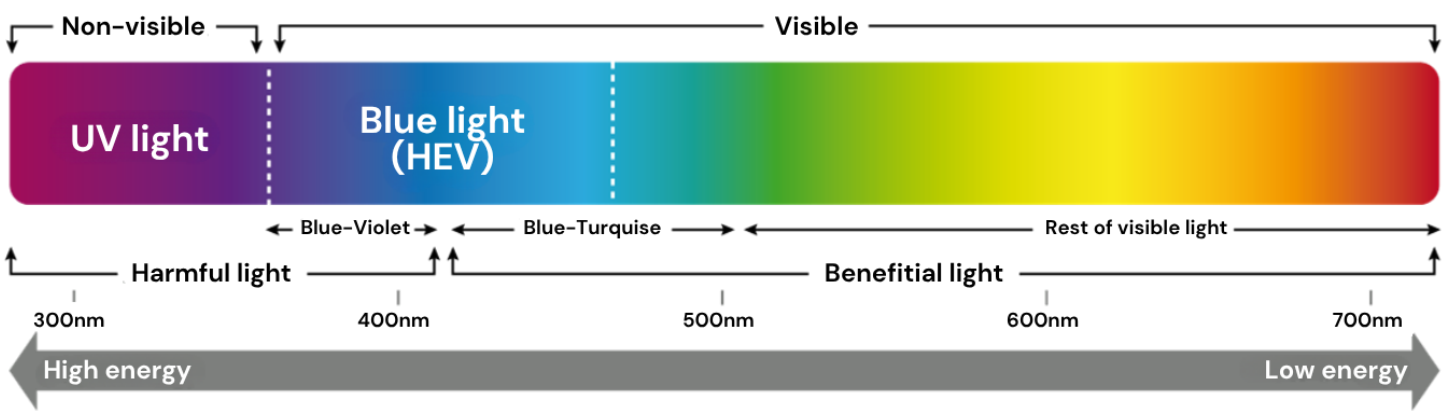
*The power of microalgae
for blue light & UV defense*

CB



We're exposed to different forms of blue light every day...

25–30% of solar radiation reaching the earth's surface is blue light



Source of blue light high energy visible (HEV 400 – 500NM)

Natural light

25–30% blue light emission

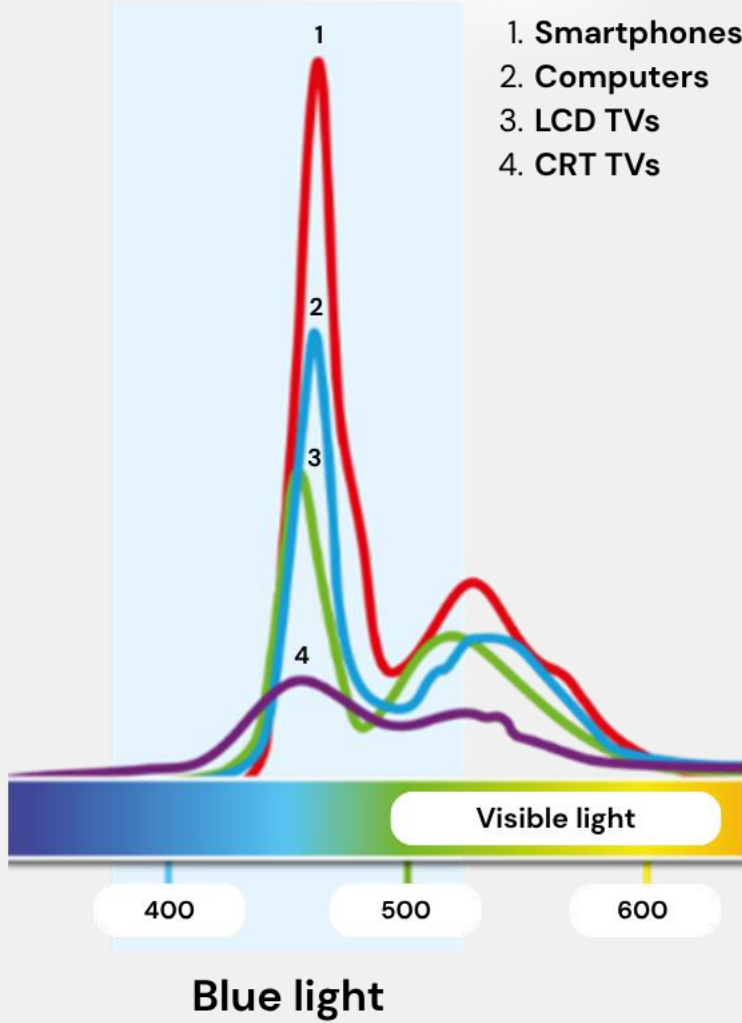
Artificial light LED

35% blue light emission

Digital devices

35% blue light emission

Indirect sun (Blue light 17mW/cm2) is about 100-fold more intense than electronic devices



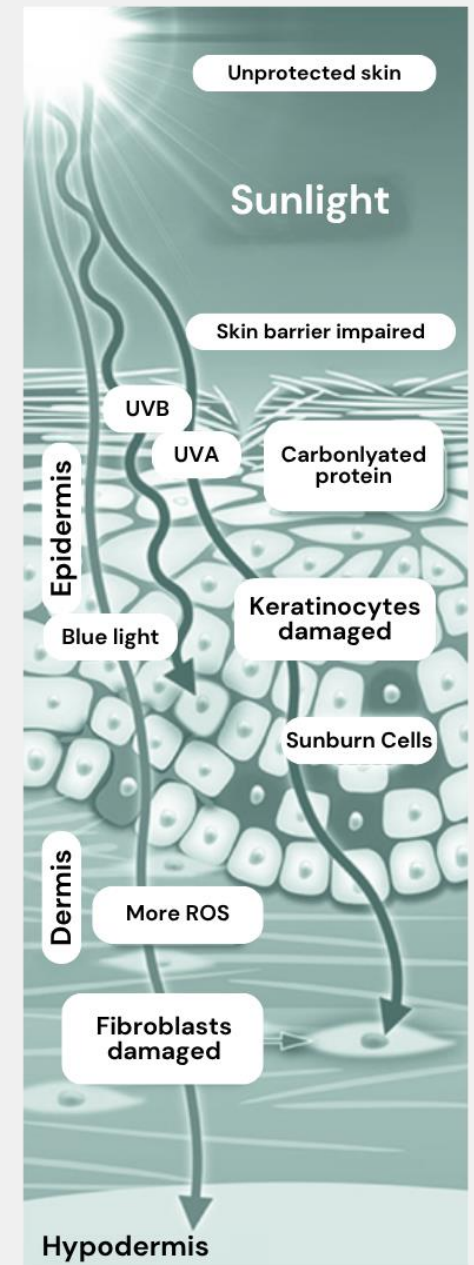
Blue light contributes to aging

Blue light penetrates deep into the skin, contributing to short- and long-term skin aging

- **Skin hyper-pigmentation** and dark spots
- **Premature aging of skin** induced by oxidative stress
 - increasing level of **free radicals** (Reactive Oxygen Species)
 - generates **carbonylated proteins**, proteins losing their functionality (responsible for yellowish, brownish color)
- **Less production of collagen**: the fibroblasts are damaged, losing their functionality in turn leading to accelerated aging (UVA adverse effect)
- **Skin barrier impaired**: the **keratinocytes** are damaged, increasing number of **sunburn cells** (UVB adverse effect)

Other negative effects on human health caused by blue light:

- Eye damage (retina, macular degeneration)
- Exposure in late evening impact the circadian rhythm (suppress production of melatonin – prevent sleep)



PEPHA®-AGE CB

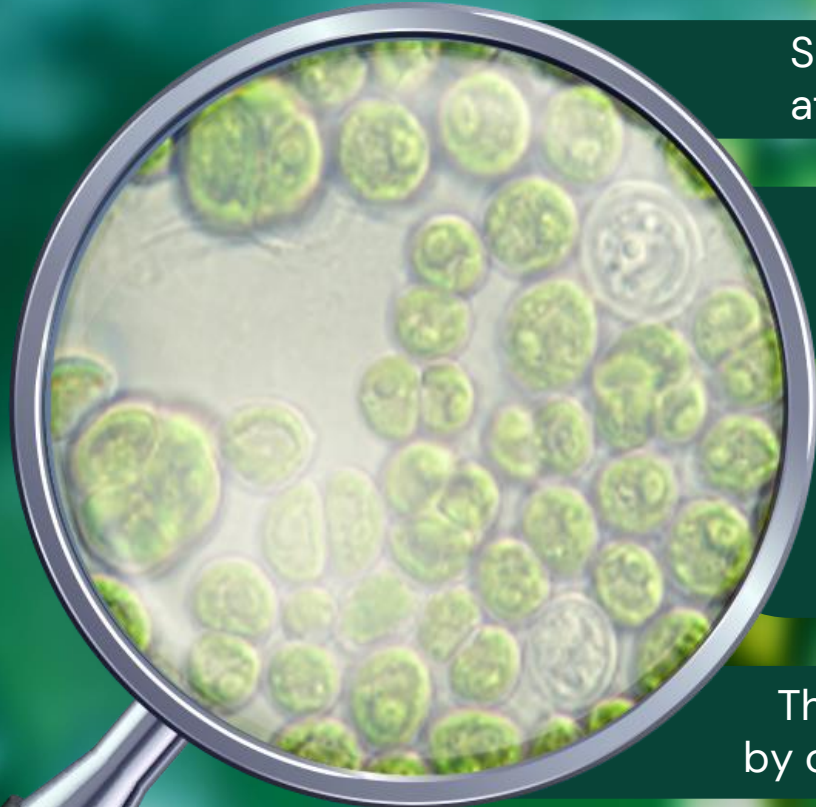
ID Card

INCI name:	Scenedesmus Rubescens Extract, Aqua, Citric Acid, Pentylene Glycol		
TECHNOLOGY:	- Sustainably farmed in photo-bioreactors, guaranteeing maximum quality (no risk of contamination, reproducibility of process, fully traceable) - Derived from Scendesmus rubescens microalgae 100% naturally-derived origin (ISO 16128)		
Technical:	Form: Yellowish-brownish clear liquid Use level: 1-3%	pH of use: 3.0 – 7.5 Preservative: Free	Solubility: Soluble in water
Benefits:	- Prevents skin premature aging - Boosts skin’s own defenses against blue light[†]/^{**} - Reduces blue light induced skin pigmentation (dark spots); evens skin tone^{***}		
Registration certification	  COSMOS APPROVED Raw material verified by ECOCERT GREENLIFE, conform to the COSMOS Standard  		

^{*} in vitro ^{**} ex vivo ^{***} in vivo

The algae

Scendesmus Rubescens



Selection of the most active micro-algae living in freshwater lakes, after a screening of several species

This **unicellular** organism (5 – 10 μm) has a very strong cell wall, the unique protection against harsh environment (sunlight, current, pollution), which releases an unique set of **active components**.

"rubescens" is coming from the latin name ruber (*red*) and escens (*becoming*). This specific species contains red dots, rich in carotenoids (compound known to absorb blue light, red lens scientifically blocks blue light)

This algae has a **circadian cycle** (growing with daylight and multiplying by cellular division in the dark)

Offers a unique variety of relevant active ingredients

PEPHA[®]-AGE CB

Amino-acids

→ Several key amino acids (Proline, Glycine, Alanine, Arginine) stimulating collagen synthesis and boosting epidermal renewing (Glutamic acid).

Vitamins

→ Multifunctional Vitamin B3, plays a central role in cellular metabolism. Energy storage, for healthy skin barrier, even pigmentation, anti-oxidant for multi-functional anti-aging benefits.

Sugars

→ Important mono and oligosaccharides relevant to stimulate cell proliferation and increase of extracellular matrix biosynthesis.

Minerals

→ Zinc, trace element, essential cofactor for biosynthesis of bio molecules for the collagen synthesis.

dsm-firmenich Solution: PEPHA®-AGE CB

Protects from blue light and UV skin damages

Ex vivo, PEPHA®-AGE CB: prevents skin premature aging

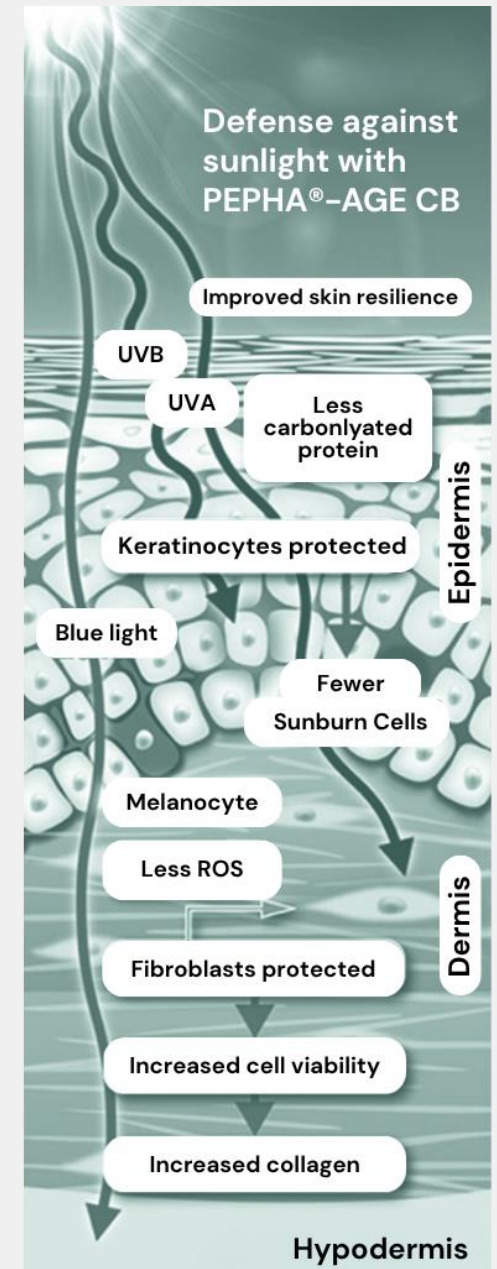
- Protects against oxidative stress. Reduces free radicals (ROS) and carbonylated proteins levels after blue light exposure

In vitro / ex vivo PEPHA®-AGE CB: boosts the skin's own defence

- Stimulates fibroblasts viability and collagen production (collagen III) (*in vitro* & *ex vivo*)
- Protects and repairs Fibroblasts viability against UVA exposure (*in vitro*)
- Repairs the skin barrier function and protects Keratinocytes against UVB (*ex vivo*)

In vivo PEPHA®-AGE CB: evens skin tone

- Reduces immediate blue light induced skin pigment darkening and dark spots
- Reduces immediate blue light induced skin redness
- Rebalances faster to skin normal pigmentation

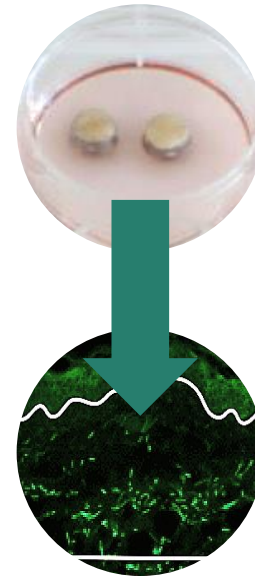
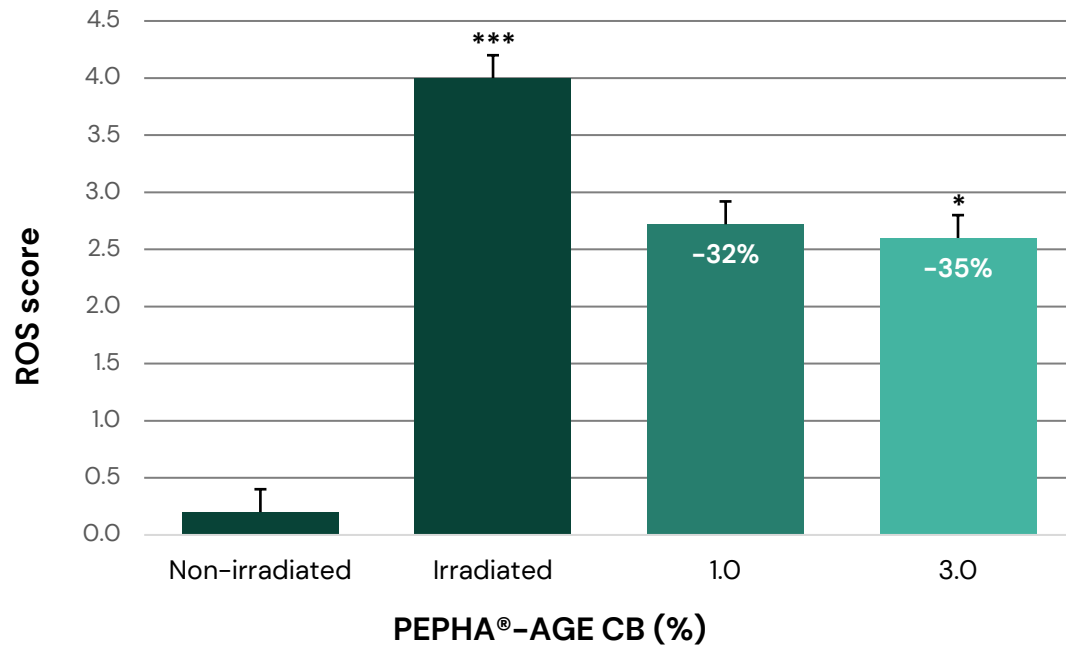


Premature skin aging

PEPHA®-AGE CB reduces blue light induced free radicals up to 35%

ex vivo

Significant reduction of ROS levels (blue light 380–470 nm)



- Topical treatment with products before and after blue light irradiation 100J/cm2*
- Skin biopsies in culture
- Donor: 65-year-old female
- After 24h analysis and quantification of fluorescent signal (green) corresponding to ROS

The ROS reduction leads to drop inflammation reactions and then to reduce skin irritation and redness

* Representing the natural dose of blue light you get within 2 hours from European midsummer sun

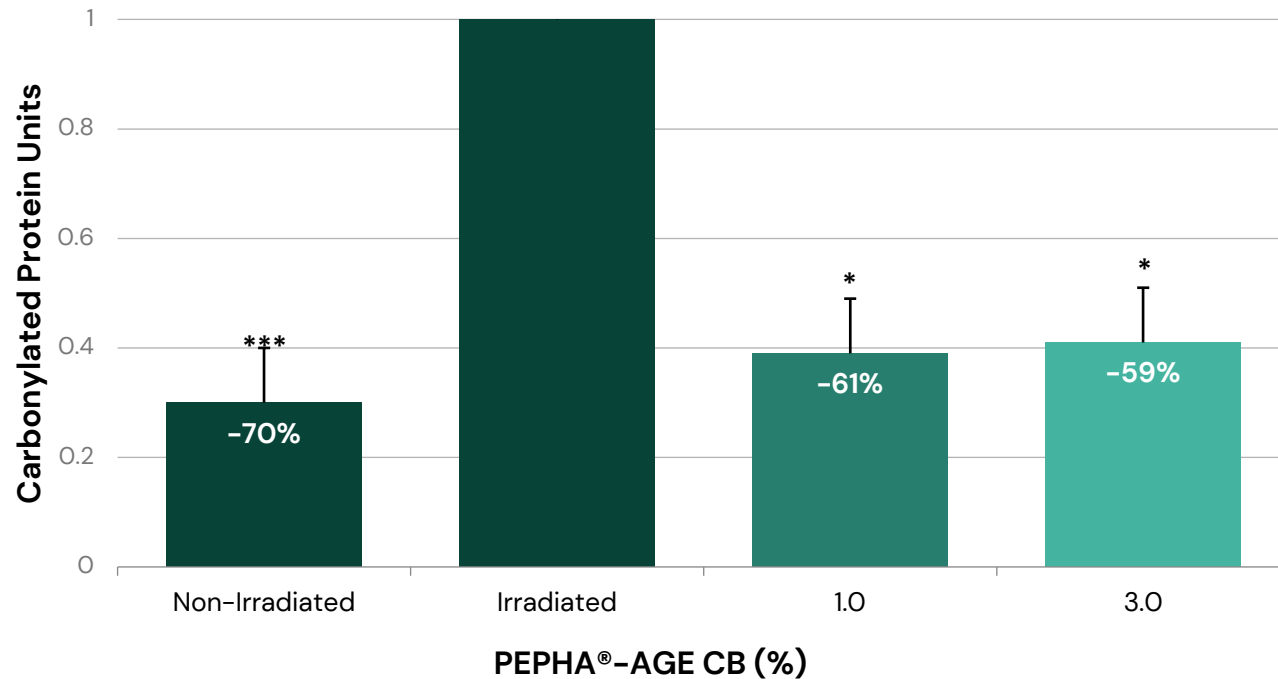
*** p<0.001 vs non irradiated, * p<0.05 vs irradiated blue light

Premature skin aging

ex vivo

PEPHA®-AGE CB reduces blue light induced carbonylated proteins up to 61%

Significant reduction of carbonylated protein levels (blue light 380–470 nm)



- Skin biopsies in culture.
- Topical treatment with products before and after blue light irradiation (100J/cm2).
- Donor: 65-year-old female

Carbonylated proteins result from an irreversible oxidative damage and give a yellowish/brownish color to the skin

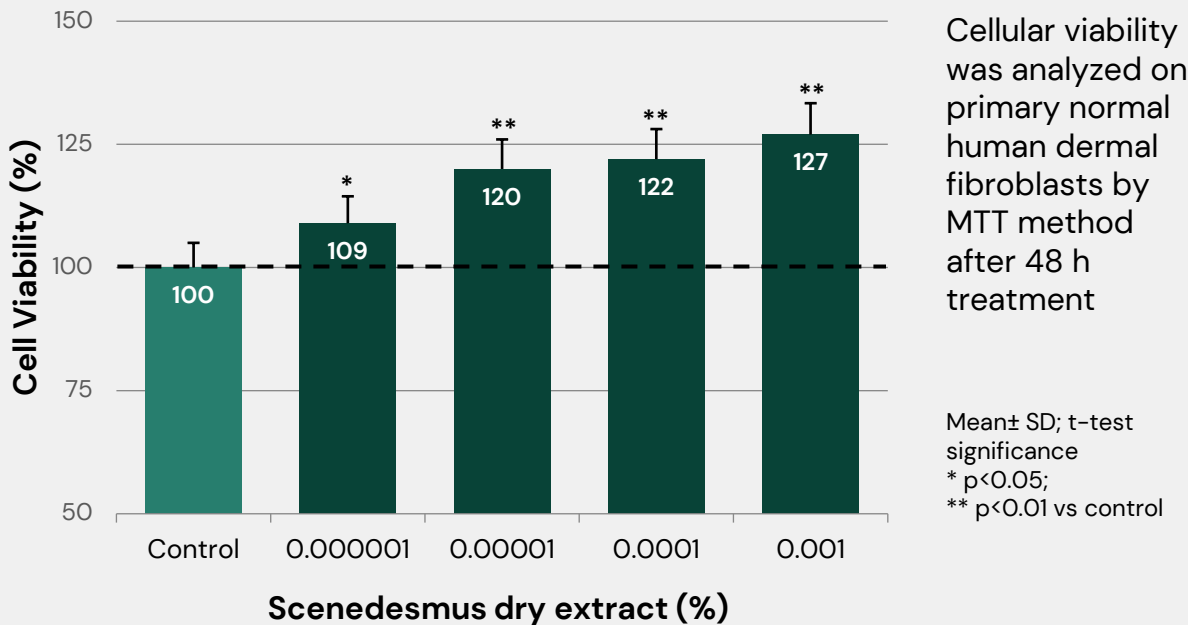
*** p<0.001 vs irradiated blue light; *p,0.05 vs irradiated blue light

Collagen stimulation

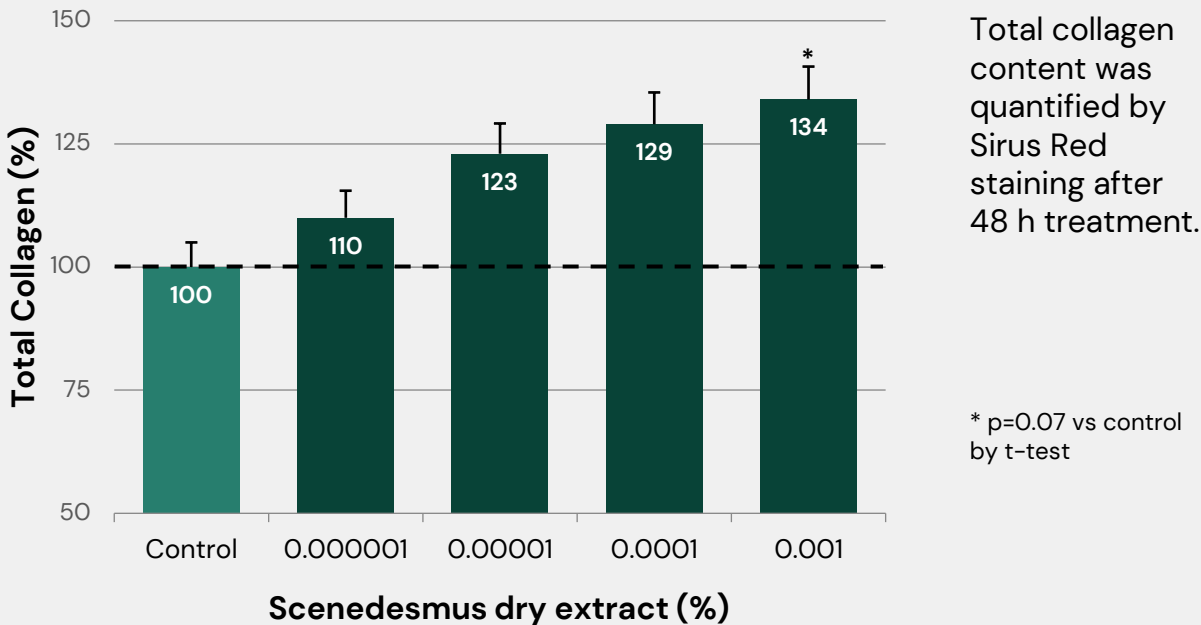
PEPHA®-AGE CB boosts cellular viability and enhances collagen by 34%

in vitro

Stimulates the viability of human dermal fibroblasts



Induced total collagen synthesis in human dermal fibroblasts



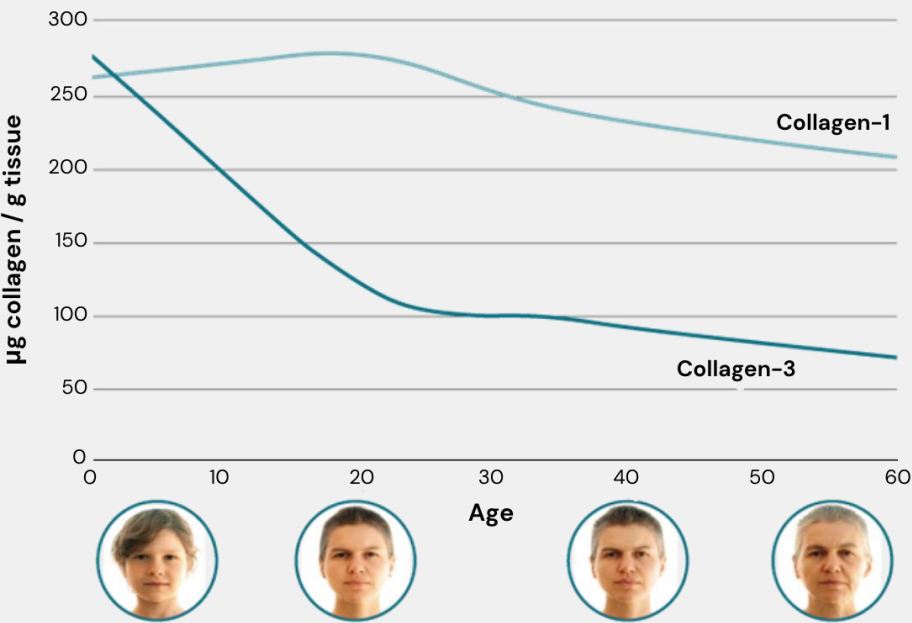
PEPHA®-AGE CB, at low concentration, stimulates in vitro total collagen up to 34% to reduce visible signs of sunlight induced ageing

Collagen III (youth collagen) 29% production boost

PEPHA®-AGE CB

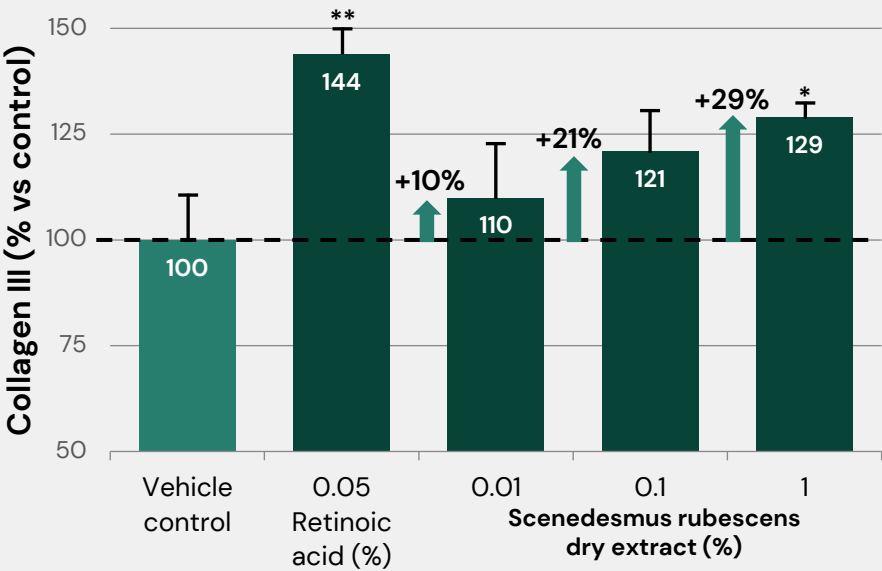
ex vivo

Collagen III dramatically decreases with age



Comparison of daily topical treatments versus DMSO at day 6.
Mean value ± SEM; *p<0.05,
** p<0.01 vs vehicle control by t-test

Collagen III stimulation with PEPHA®-AGE CB



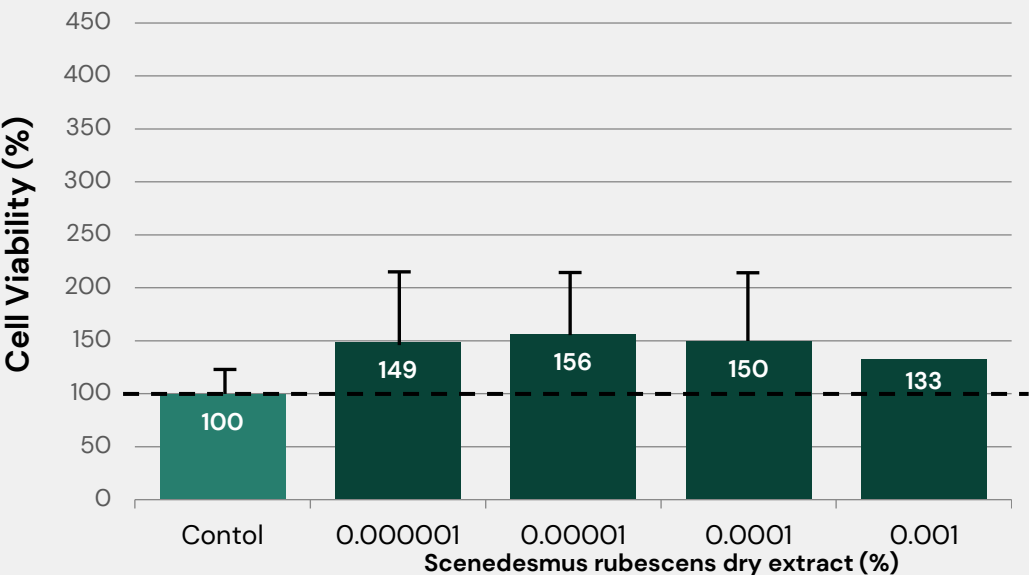
Test samples and control (4 µl) were topically applied on human skin biopsies (Ø 8 mm) for 6 days, donor: 43 years old. Immunohistochemical staining of Collagen type III

PEPHA®-AGE CB significantly strengthens the dermis and reduces visible sign of sunlight induced ageing

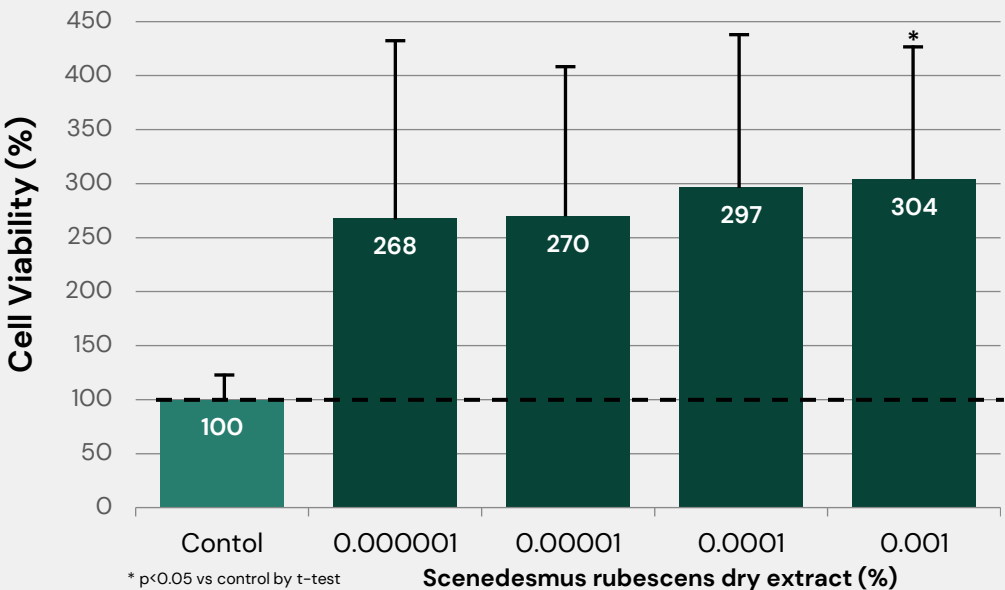
PEPHA®-AGE CB protects and regenerates fibroblasts

in vitro

Cellular protection
PEPHA®-AGE CB: Treatment 1h **before** UVA



Cellular regeneration
PEPHA®-AGE CB: Treatment 1h **after** UVA



PEPHA®-AGE CB protects the fibroblasts (up to 50%) from UV stress and regenerates the fibroblasts functionality (up to 200 %) after UV stress.

Cellular viability was measured 48 h after UVA irradiation (20 J/cm2) using human dermal fibroblasts

Skin barrier repair

PEPHA®-AGE CB reduces the number of sunburn cells by 63% against UVB

Protection of keratinocytes

Sunburn cells are keratinocytes undergoing programmed cell death (apoptosis) after they have received a UVB dose that irreversibly and severely damaged their DNA.

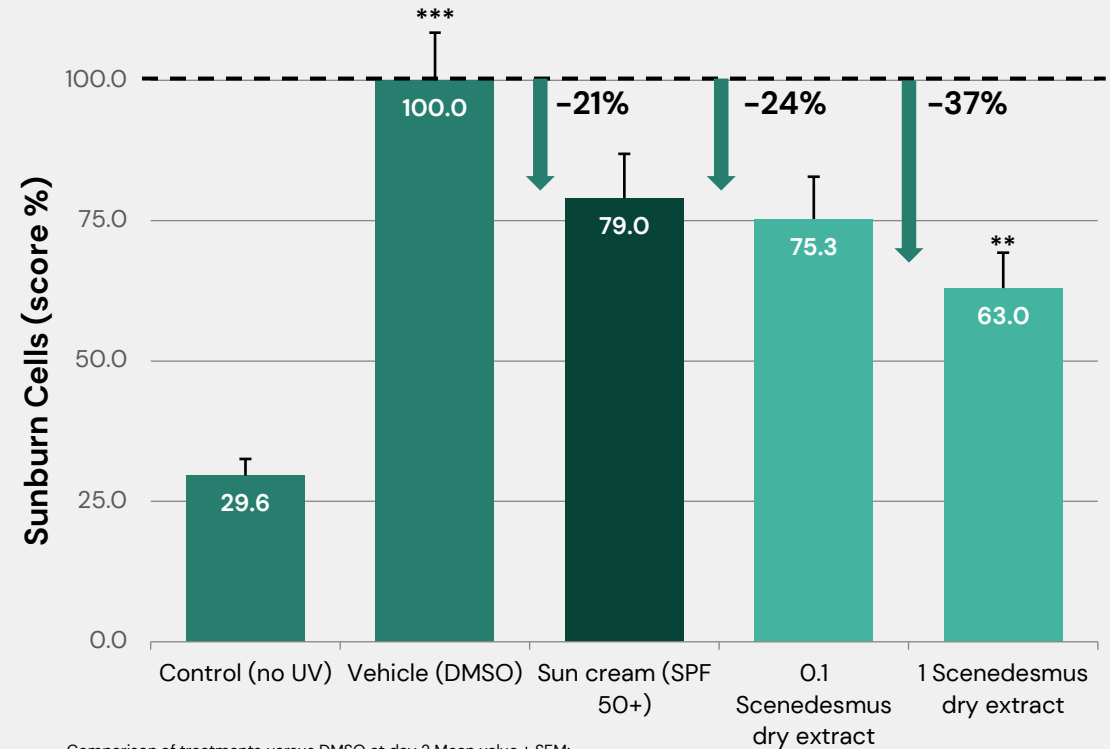
An increasing number is a key indicator for ongoing damage in the epidermis.

PEPHA®-AGE CB protects skin against sunlight induced epidermal damage

*** p<0.001 vs no UV by t-test

** p<0.01 vs vehicle by t-test

in vitro

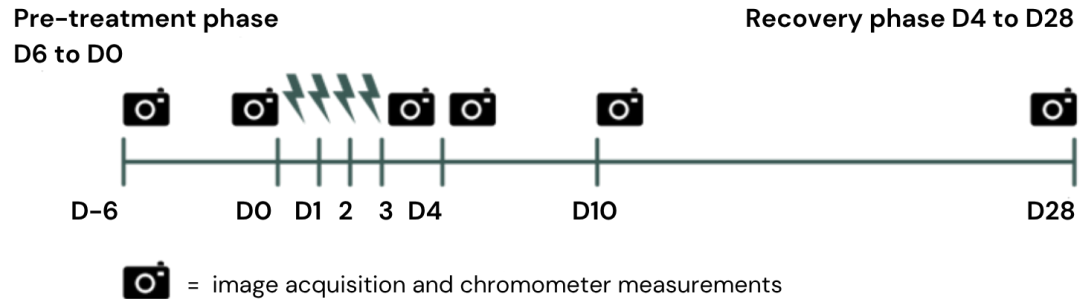


Comparison of treatments versus DMSO at day 2 Mean value $\pm$ SEM;
** p<0.01 vs DMSO; *** p<0.001 vs noUV by (unpaired t-test)

- Test samples and control were topically applied on human skin biopsies
- 24 h and 1 h prior UVB irradiation
- (1 J/cm²) against standard market product SPF 50+

PEPHA®-AGE CB blue light *in vivo* study design

- 33 female volunteers (mean 32 years old, Caucasian 80% and Asian skin 20%)
- Randomized double blind with placebo
- Cream formulations with 3% PEPHA®-AGE CB (without sun filter)
- Forearm application once a day for 34 days (application started 6 days before blue light exposure to strengthen the skin)
- Exposition 4 days consecutively on forearm with LED lamp at 450nm with 60J/cm²*:



in vivo



Skin color measurements (chromameter) and Image analysis

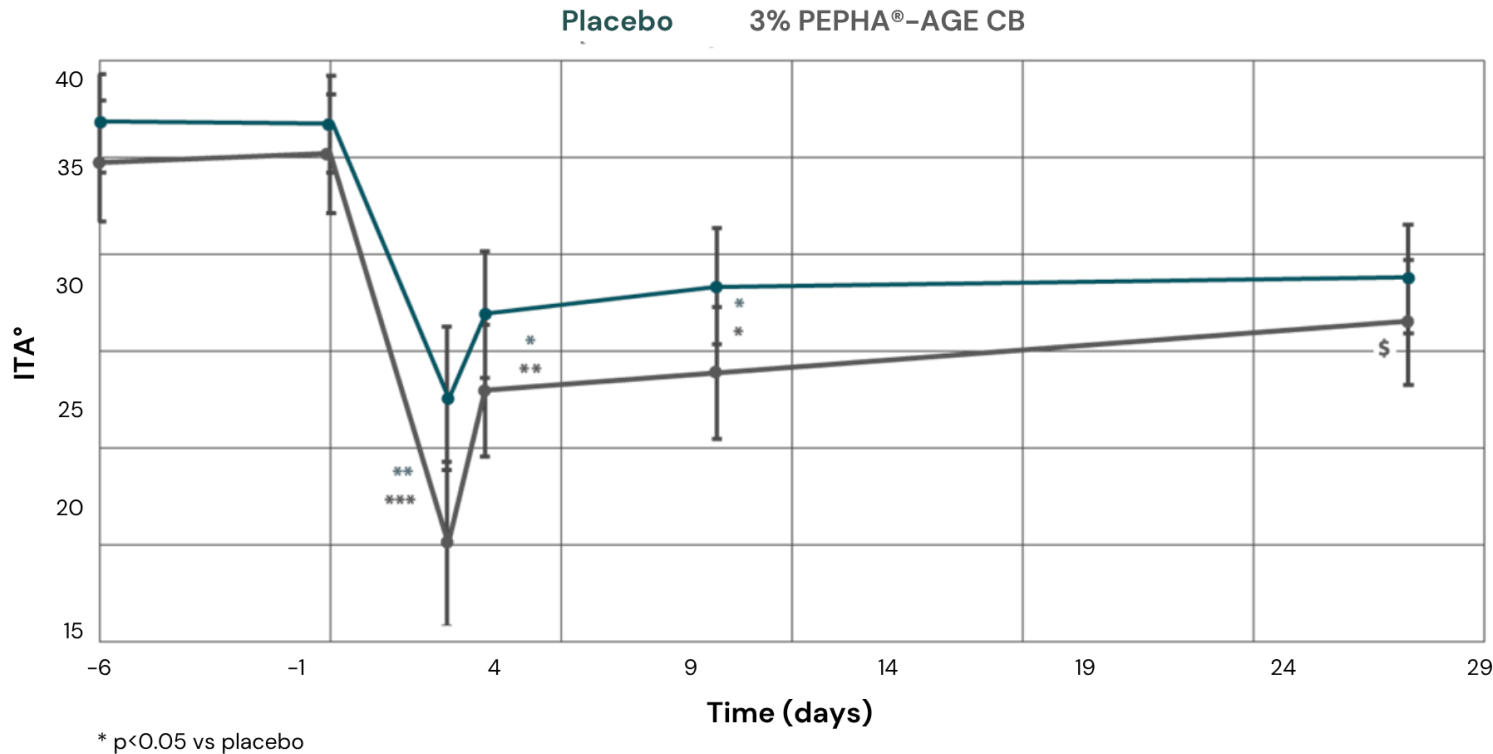
* natural dose you get within one hour from European midsummer sun)

Skin darkening

PEPHA®-AGE CB reduces blue light induced immediate skin hyper-pigmentation by 30%

in vivo

Colorimetry ITA° angle



ITA° is inversely correlated with skin pigmentation: **the lower the ITA value, the darker the skin**
Colorimetry ITA angle, ITA° takes into account 2 parameters: luminance (L*) and yellow-blue tone (b*).

PEPHA®-AGE CB proves to be highly effective against hyper-pigmentation:

- Immediate reduction of skin pigment darkening (-30%)
- Rebalance faster to skin normal pigmentation
- Restores even skin tone

Reduces blue light induced skin pigment darkening

PEPHA®-AGE CB

in vivo

RDO12 right
3% PEPHA®-AGE CB

DO

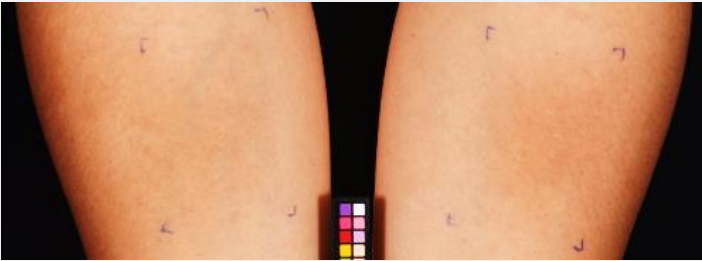
RDO12 left
Placebo



RDO12 right
3% PEPHA®-AGE CB

D4

RDO12 left
Placebo



RDO12 right
3% PEPHA®-AGE CB

D3

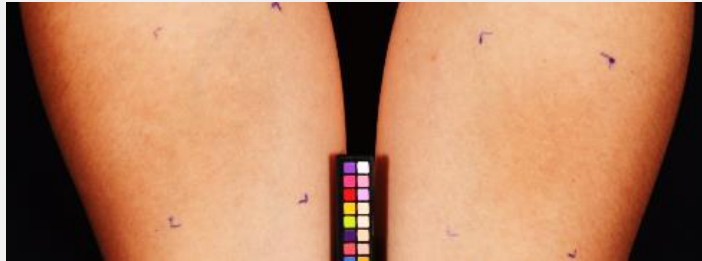
RDO12 left
Placebo



RDO12 right
3% PEPHA®-AGE CB

D10

RDO12 left
Placebo



Skin coloration:
ITA°

Volunteer 12 – ITA° – left forearm with placebo and right with 3% PEPHA®-AGE CB

Reduces blue light induced redness

PEPHA®-AGE CB

in vivo

RDO13 right 3% PEPHA®-AGE CB **DO** RDO13 left Placebo



7.1 6.9

RDO13 right 3% PEPHA®-AGE CB **D4** RDO13 left Placebo



8,1 11.6

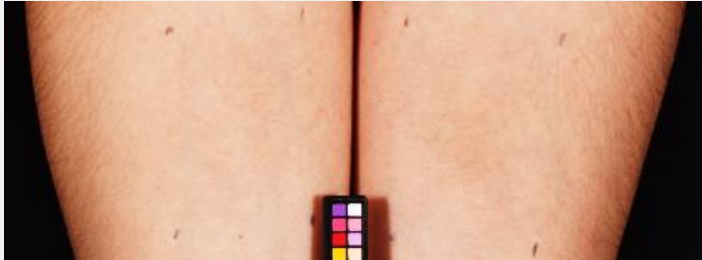
Skin coloration
a* value

RDO13 right 3% PEPHA®-AGE CB **D3** RDO13 left Placebo



10.4 13.4

RDO13 right 3% PEPHA®-AGE CB **D10** RDO13 left Placebo



7.9 8.7

Volunteer 13 – left forearm with placebo and right with PEPHA®-AGE CB a higher a* value a higher redness

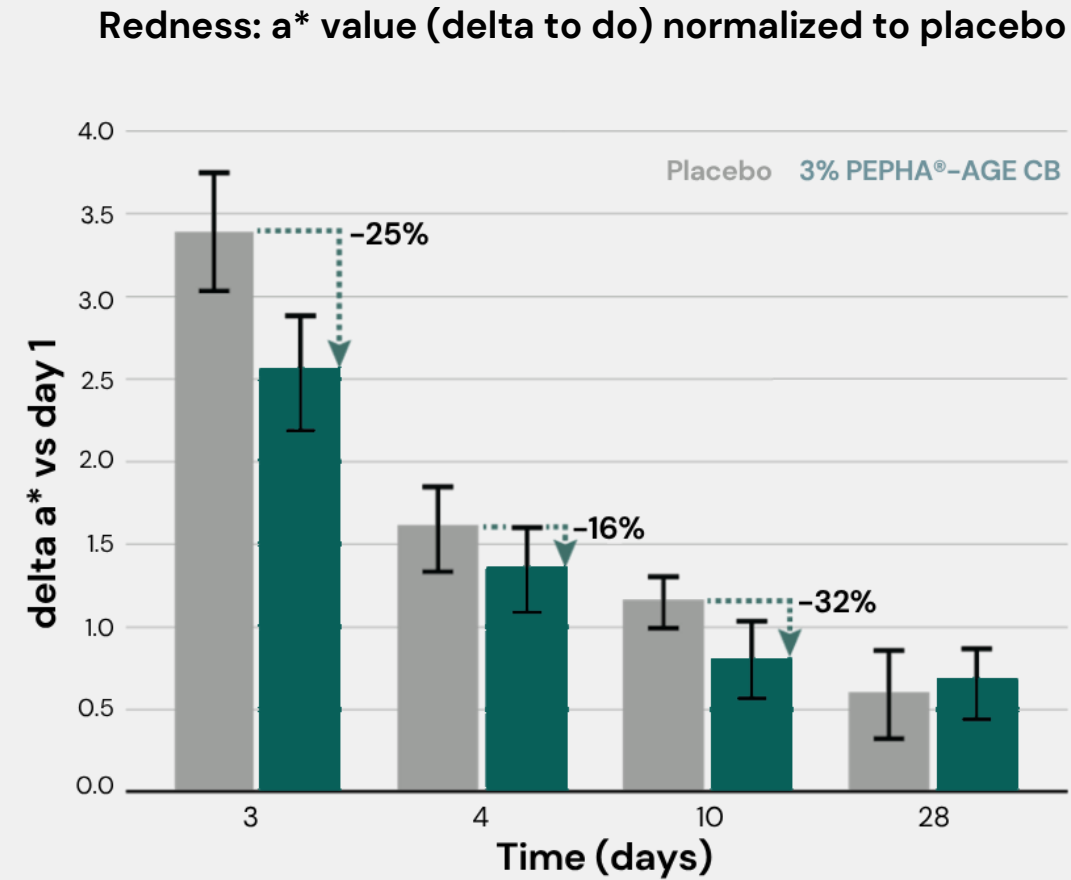
Reduces blue light induced redness

30% reduction of blue light induced skin redness with PEPHA®-AGE CB

in vivo

PEPHA®-AGE CB protects the skin against immediate irritation induced by blue light.

The skin color is less red (-25% with 3% PEPHA®-AGE CB compared to placebo) just after 4 days blue light irradiation



Formulation Guidelines

PEPHA[®]-AGE CB

INCI name (active): Scenedesmus
Rubescens Extract

- Clear yellow-brownish to brown liquid
- Stable at pH ranges from 3.0 to 7.5
- Should be processed below 40°C
- Suggested concentration: 1–3 %

Cosmetic application

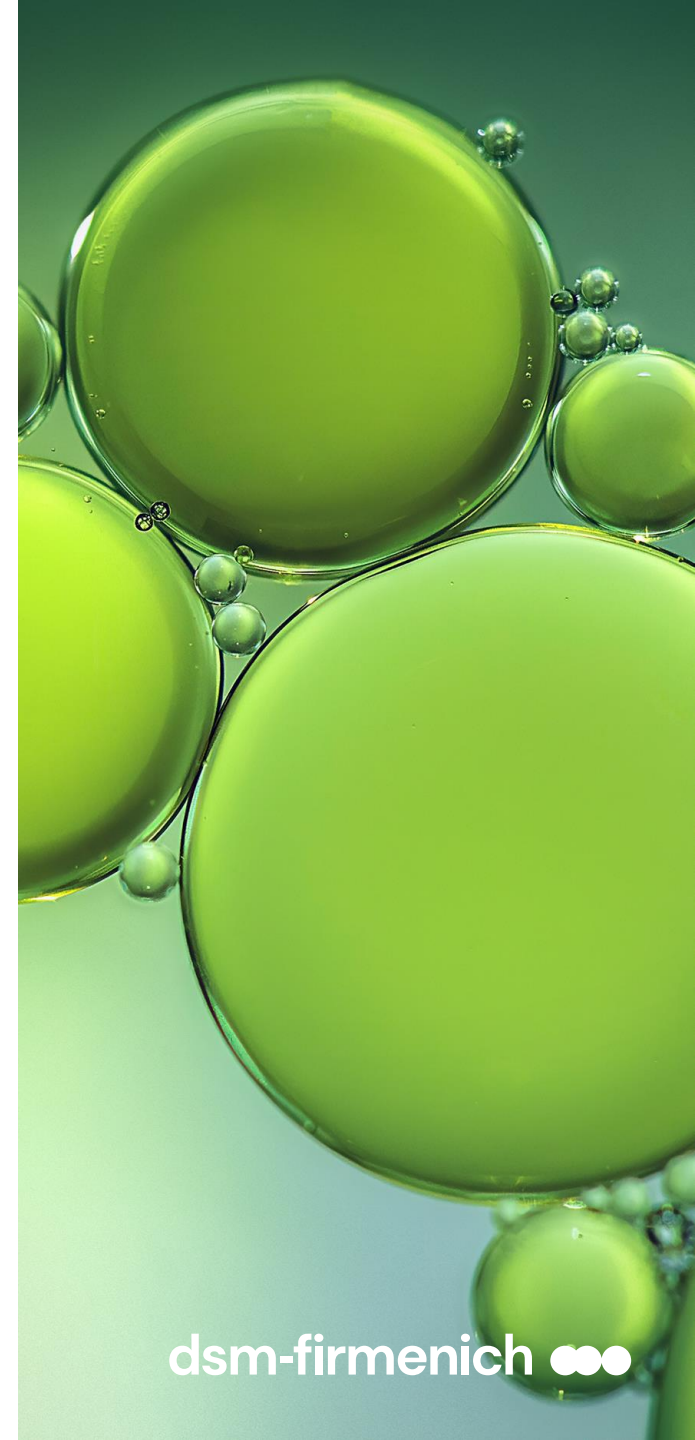
- Day care products
- Sun care and after sun formulations
- Regenerative night care
- Anti-aging products



PEPHA[®]-CTIVE

Supported marketing claims

- Minimizes the appearance of ageing after exposure to blue light and UV
- Reduces skin damage caused by natural and artificial blue light sources
- Improves overall skin appearance and offers an even skin tone



A woman is floating on her back in dark, rippling water. She is wearing a green, textured swimsuit that appears to be made of algae. Her eyes are closed, and she has a serene expression. The water is dark and reflective, with some light catching the surface. The overall mood is peaceful and natural.

DEEP BEAUTY

The power of algae with PEPHA[®] MICROALGAE ingredients

DEEP BEAUTY

Discover the hidden secret of nature for a healthy-looking skin!

Powered by **blue biotechnology** ingredients, the deep beauty skincare range nourishes skin, protects against external aggressors and helps minimize the appearance of fine lines and wrinkles with an immediate and long-lasting lifting effect. For skin that looks firmer, more vibrant healthier.

Is this not the ultimate deep beauty?!

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DEEP BEAUTY



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DEEP BEAUTY

RADIANT DAY SHIELD
SPF 30

With **PEPHA®-AGE CB**, **PARSOL® UV-filters**,
DL-alpha-Tocopheryl Acetate, **VALVANCE® Touch**
210, **HYA-ACT™ M**

This luxurious soft texture is designed to boost skin's own defenses against photo-ageing for a radiant looking complexion. Packed with high-performing UV-filters and Blue Biotechnology, it protects against external aggressors (including UV & blue light) and promotes skin natural repair processes. For skin that feels stronger and healthier looking.

80.17% natural origin content according to ISO 16128.

SK-E-102111-4

Radiant day shield SPF 30

	Ingredients	INCI Name	% W/W
A	Cetiol® B	DIBUTYL ADIPATE	7,00
	PARSOL® EHS	ETHYLHEXYL SALICYLATE	3,00
	PARSOL® EHT	ETHYLHEXYL TRIAZONE	2,00
	PARSOL® Shield	BIS-ETHYLHEXYLOXYPHENOL METHOXYPHENYL TRIAZINE	1,50
	PARSOL® 1789	BUTYL METHOXYDIBENZOYLMETHANE	1,00
	Dermosoft® GMCY MB	GLYCERYL CAPRYLATE	0,50
	TEGIN® M Pellets MB	GLYCERYL STEARATE	0,40
	TEGO CARE PBS 6 MB	POLYGLYCERYL-6 STEARATE, POLYGLYCERYL-6 BEHENATE	3,20
	DL-alpha-Tocopheryl Acetate	TOCOPHERYL ACETATE	0,50
	Lanette® O	CETEARYL ALCOHOL	1,00
	Lexfilm Sun Natural MB	CAPRYLOYL GLYCERIN/SEBACIC ACID COPOLYMER	1,50
	VALVANCE® Touch 210	SILICA	2,00
	DUB DIS	DIISOPROPYL SEBACATE	4,00
B	PARSOL® HS	PHENYLBENZIMIDAZOLE SULFONIC ACID	2,00
	HYA-ACT™ M	SODIUM HYALURONATE	0,10
	Sodium Hydroxide Pellets Emprove	SODIUM HYDROXIDE	0,30
	Dermofeel® PA-3	SODIUM PHYTATE, AQUA, ALCOHOL	0,10
	Water Dem	AQUA	60,27
	PARSOL® Max	METHYLENE BIS-BENZOTRIAZOLYL TETRAMETHYLBUTYLPHENOL, AQUA, DECYL GLUCOSIDE, PROPYLENE GLYCOL, XANTHAN GUM	4,00
	Dermosoft® Octiol	CAPRYLYL GLYCOL	0,20
C	Propanediol	PROPANEDIOL	2,00
	Verdessence Xanthan	XANTHAN GUM	0,30
D	PEPHA®-AGE CB	SCENEDESMUS RUBESCENS EXTRACT, AQUA, PENTYLENE GLYCOL, CITRIC ACID	3,00
E	Sodium Hydroxide 10% Solution	AQUA, SODIUM HYDROXIDE	0,13

Procedure

1. Mix ingredients of Phase A and warm up to 75°C, until a clear solution is obtained.
2. Mix Phase B while heating up to 75°C.
3. Premix Phase C and add it to Phase B.
4. Add Phase A to Phase B+C and homogenize 5 minutes.
5. Cool down to room temperature under gentle stirring.
6. Add Phase D at 30°C and keep stirring.
7. Adjust the pH to 7.0-7.5 with Phase E.

Technical Data

pH: 7.28

Viscosity (spindle RV 03/ 10 rpm): 4540 mPa.s

The formulation fulfils the 3 months stability at 4°C, 40°C, 50°C, Room Temperature and Daylight

SK-E-102111-4

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With an Eco Class A rating, this formulation minimizes the impact on the environment.

SPF and Eco Class calculated by the dsm-firmenich Sunscreen Optimizer™ 2.0





DEEP BEAUTY

2IN1 MILKY LOTION
ON-THE-GO

With **PEPHA®-TIGHT CB**, **PEPHA®-CTIVE CB**, **ARGAN OIL**, **Mixed Tocopherols 95**, **SYN®-COLL CB** and **D-Panthenol 75 L**

Your skin ally for an on-the-go extra boost of nourishment! Packed with Marine Biotech Complex, rich in amino acids, vitamins, minerals, antioxidants and essential fatty acids for immediate and long-lasting healthy-looking skin. This lightweight milky texture is designed for dual application:

- roll it over targeted zones for precision tightening
- spray it in a fine facial mist for instant hydration that smoothens and re-energizes your skin

99.39% natural origin content according to ISO 16128

SK-E-102022-36

For internal use only. Illustrated products are for experimental use and are not for sale. dsm-firmenich is not responsible for final products claims

2in1 milky lotion on-the-go

	Ingredients	INCI Name	% W/W
A	Water Dem	AQUA	88,23
	Cosphaderm® Pentiol natural	PENTYLENE GLYCOL	3,00
	Dermosoft® Octiol	CAPRYLYL GLYCOL	0,20
	Sucrathix VX	MICROCRYSTALLINE CELLULOSE, CELLULOSE GUM, XANTHAN GUM	1,00
	SOLAGUM™ AX	ACACIA SENEGAL GUM, XANTHAN GUM	0,20
	SUCRABLEND SP V2	SUCROSE STEARATE, SUCROSE PALMITATE	1,00
B	Myritol® 331	COCOGLYCERIDES	2,75
	Kokosoel raffiniert Ph. Eur.	COCOS NUCIFERA OIL	1,00
	ARGAN OIL	ARGANIA SPINOSA KERNEL OIL	1,00
	Lanette® O	CETEARYL ALCOHOL	0,25
	Mixed Tocopherols 95	TOCOPHEROL	0,10
C	PEPHA®-TIGHT CB	NANNOCHLOROPSIS OCULATA EXTRACT, PULLULAN, AQUA, PENTYLENE GLYCOL, CITRIC ACID	0,35
	SYN®-COLL CB	PALMITOYL TRIPEPTIDE-5, GLYCERIN, AQUA	0,46
	PEPHA®-CTIVE CB	DUNALIELLA SALINA EXTRACT, AQUA, PENTYLENE GLYCOL, CITRIC ACID	0,30
	D-Panthenol 75 L	PANTHENOL, AQUA	0,10
D	Citric Acid 10% Solution	CITRIC ACID, AQUA	0,06

Procedure

1. Mix Phase A and heat up to 75–80°C.
2. Mix Phase B and heat up to 75–80°C.
3. Add Phase B to Phase A.
4. Homogenize 1 min with Ultra-Turrax.
5. Let cool down under stirring.
6. Add Phase C at room temperature.
7. Adjust pH to 5.5 with Phase D.
8. Homogenize again 1 min with Ultra-Turrax.

Technical Data

pH: 5.43

Viscosity (spindle RV 03/ 10 rpm): 1080 mPa.s

The formulation fulfils the 3 months stability at 4° C, 40° C, 50° C, Room Temperature and Daylight

SK-E-102022-36

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DEEP BEAUTY

REVITALIZING SERUM

With **PEPHA[®]-CTIVE CB, PEPHA[®]-TIGHT CB**

A concentrated shot of the most powerful marine ingredients for strong anti-aging benefits. Skin looks firmer and plumper, evener and re-energized.

100% natural origin content according to ISO 16128

SK-E-102087-5

For internal use only. Illustrated products are for experimental use and are not for sale. dsm-firmenich is not responsible for final products claims

Revitalizing serum

	Ingredients	INCI Name	% W/W
A	Water Dem	AQUA	54,50
	PEPHA®-CTIVE CB	DUNALIELLA SALINA EXTRACT, AQUA, PENTYLENE GLYCOL, CITRIC ACID	3,00
	PEPHA®-TIGHT CB	NANNOCHLOROPSIS OCULATA EXTRACT, PULLULAN, AQUA, PENTYLENE GLYCOL, CITRIC ACID	3,00
B	Propanediol	PROPANEDIOL	39,50

Procedure

1. Prepare the Phase A.
2. Prepare Phase B and add it to Phase A.

Technical Data

pH: 5.4

Viscosity: Liquid



The formulation fulfils the 3 months stability
at 4°C, 40°C, 50°C, Room Temperature and Daylight

SK-E-102087-5

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DEEP BEAUTY

INSTANT TIGHTENING
ULTRA-PRECISION STICK

With **PEPHA®-TIGHT CB, ALPAFLOR® EDELWEISS CB**

A concentrated solid serum stick for targeted application. Enriched with powerful Active Algae, it helps minimize the appearance of fine lines and wrinkles with an immediate tightening effect and, when applied regularly, it acts as a protective shield against oxidative stress for healthier and firmer looking skin.

100% natural origin content according to ISO 16128

SK-E-101904-15

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Instant tightening ultra-precision stick

	Ingredients	INCI Name	% W/W
A	Water Dem	AQUA	48.70
	Glycerine CremerGLYC 86.5%	GLYCERIN	15,00
B	Propanediol	PROPANEDIOL	15,00
	Kelcogel® CG-LA	GELLAN GUM	0,50
C	RonaCare® Sodium Chloride	SODIUM CHLORIDE	0,50
	Water Dem	AQUA	9,00
D	Sodium Stearate OP-200 V	SODIUM STEARATE	6,30
E	Silica, Titanium Dioxide	SILICA, TITANIUM DIOXIDE	1,00
F	ALPAFLOR® EDELWEISS CB	LEONTOPODIUM ALPINUM FLOWER/LEAF EXTRACT, GLYCERIN, AQUA, CITRIC ACID	3,00
	PEPHA®-TIGHT CB	NANNOCHLOROPSIS OCULATA EXTRACT, PULLULAN, AQUA, PENTYLENE GLYCOL, CITRIC ACID	1,00

Procedure

1. Mix Phase B and add to Phase A.
2. Heat up to 90°C.
3. Stir until homogeneous.
4. Add Phase C and stir until homogeneous.
5. Add Phase D and stir until dissolved (light turbid).
6. Add Phase E and cool down to 80°C.
7. Add Phase F and stir until homogeneous.
8. Then fill into packaging at 75°C.



The formulation fulfils the 3 months stability at 4°C, 40°C, 50°C, Room Temperature and Daylight

SK-E-101904-15

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